FAO FISHERIES BULLETIN

Volume 6, Number 3 May-June 1953

CONTENTS

DANISH SEINING 63

FISHERIES RESEARCH CENTER IN SPAIN 88

CONFERENCES AND MEETINGS 90

FISHERIES DIVISION ACTIVITIES. 91

NOTES ON FILMS 100

NOTES ON PUBLICATIONS 101

Editor: D. B. Finn *Assistant Editor:* Anna Mae Singer Jul

FAO Fisheries Bulletin is prepared by the staff of the Fisheries Division and published bimonthly by the Food and Agriculture Organization of the United Nations in Rome, Italy. *FAO Fisheries Bulletin* is published in English, French and Spanish. The contents have not been copyrighted and may be reprinted freely, but reference to source will be appreciated. Annual subscription U.S. $1.50, single copy 30 cents ; rates are payable in local currencies when orders are placed through local sales agents. See inside back cover for list of sales agents.

Opinions expressed in signed articles by non-FAO staff members are not necessarily those of the Organization.

Printed in Italy

Figure 1. Typical Danish seiner at sea.

Figure 2. Typical Scottish seine netter.

DANISH SEINING

I. History

This method of fishing was invented in Denmark, in 1848, by a fisherman named Jans Vaever. At first used only for flatfish in the shallow coastal waters, the technique was found to be so effective and the fish caught of such high quality that, by the turn of the century, it was in use by large sea-going cutters in the Kattegat, Skagerrak and the North Sea.

In the early 1920's the technique spread to England, being first tried by Lowestoft herring drifters during the off-season, and then in Norway. A few years later Scotland adopted it and found it so successful that it is now almost the only inshore fishing method used for white fish in that country. From Scotland the method has spread, to Ireland, and in recent years was introduced in Australia, New Zealand and Newfoundland. A type of Danish seine is also used in Japan under the name Funabiki Ami.

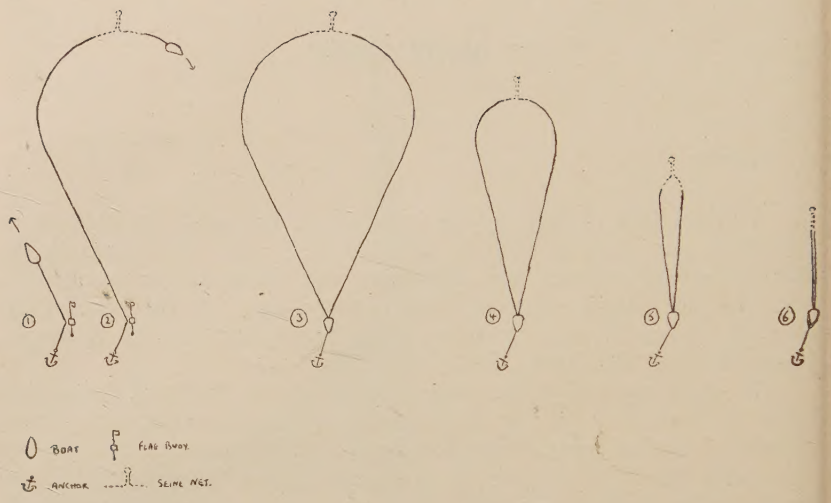
Today, almost exactly a hundred years after its humble beginning, Danish seining ranks as one of the more important European fishing methods, employing thousands of fishermen who catch a wide variety of fish.

II. Method of Operation

Briefly, Danish seining consists in surrounding a large area of sea bed with two very long ropes and a net in such a way that when the ropes are pulled in and the area enclosed by them becomes smaller, the fish on or near the bottom in the enclosed area are driven into the center and collected by the net (*see* Figure 3).

III. Advantages

Firstly, the area of the ground covered is very great, a deep sea seiner often using 1,200 to 1,500 fathoms of rope on each side of the net; secondly, the method is very efficient, a very high percentage of the bottom fish in the area being caught, only those near the anchor escaping; thirdly, the quality of the fish caught is excellent, due to the fact that they are in the net only a short time and are invariably taken aboard alive. In addition, the power required in relation to the quantity of fish that can be caught is quite low, all the work being done by the winch. Thus, the method may be used by low-powered boats that would otherwise be able to operate only a very small trawl with a correspondingly low catching power.



(1) The boat has put down an anchor and a dahn buoy to which is attached one end of a long warp, usually 2 1/4 in. manila and anywhere from 600 to 1,500 fathoms long. The boat then steams away in a large arc, paying out the rope as she goes.

(2) The boat has turned across the tide and shot the net which is made fast to the end of the rope. The net is shot in a straightline with the wings wide open, the codend being thrown out at right angles to the wings as it is being shot. A second identical warp is fixed to the end of the last wing and the boat continues its way back to the dahn buoy, paying out the rope as before (Figure 4 overleaf shows a typical seine net).

(3) The boat has now made fast to the anchor, the two ends of the ropes have been put on the winch, * the net and all the ropes have sunk to the bottom, and fishing commences. The winch is put in low gear and the ropes are slowly pulled in (approximately 1 1/2 m.p.h.). The fish, scattered about on the sea bed, are frightened by the cloud of sand and the vibrations caused by the moving ropes into an ever-decreasing area.

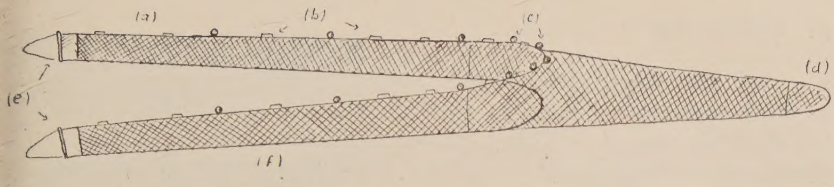
(4) One-third of the ropes have been winched in and the area has shrunk to less than half. Now the winch is put into middle gear (approximately 2 1/2 m.p.h.), driving the fish in and bringing the net towards the boat and, when the fish are concentrated in a narrow area between the ropes. The winch is put into high gear, 3 to 4 m.p.h.

(5) Now the net comes along in the same manner as a trawl, sweeping the fish up on the way. As the ropes have been closing, so have the wings of the seine until finally, when about two-thirds of the rope has come in,they are completely closed.

(6) No more fish can now be caught and the net is kept coming in at top speed until all the rope is in. The winch is then stopped, the net pulled in by hand and the cod-end taken aboard with the tackle.

Figure. 3 Operation of a Danish seine.

*** In the days before engines were known in fishing boats, the ropes were pulled in by hand. Then steam winches were introduced, but the coiling of ropes was still done manually. Finally, automatic coilers were invented and these are now used almost universally in conjunction with motor-driven, multi-speed winches.**



(a) Head-line (b) Cork (c) Float (d) Cod end (e) Dan Lenos (f) Lead-line

Figure 4. Danish seine net.

IV. Disadvantages

The main drawback to the Danish seine is that the ground must be quite smooth and clear of rocks, coral, boulders and the like. The tides must not be strong (approximately 2-3 knots, at the most), otherwise the net will be lifted off the bottom at the crucial moment [*see* Figure 3, (5)] and the fish will be lost. Furthermore, expenses on rope are heavy as, besides their initial cost, they wear out and have to be replaced. Last, but not least, Danish seining is very tiring and calls for a high degree of skill. Whereas with trawling the crew can sit down and have a smoke while the net is down, in seining alternate shooting and hauling is continuous. This is off-set to some extent by the fact that, as seining is usually carried on only in daylight, the men get a chance to rest at night.

V. Methods of Use

There are two main methods : *anchor fishing* and *fly-dragging*.

A. Anchor Fishing

This method is widely used in Scandinavian countries and by some English boats. The fish most usually caught in this manner is plaice, although haddock, whiting and cod are also taken.

1. *Conditions Necessary for Successful Operation*

The natural requirements are :

ground : must be smooth, preferaoly sand, mud or clay ; no rocks, coral or large stones ;

tide : as little as possible ; not more than 3 knots ;

water : any depth up to 100 fathoms ;

weather : as calm as possible ; maximum 5-6 Beaufort wind scale.

The mechanical requirements are :

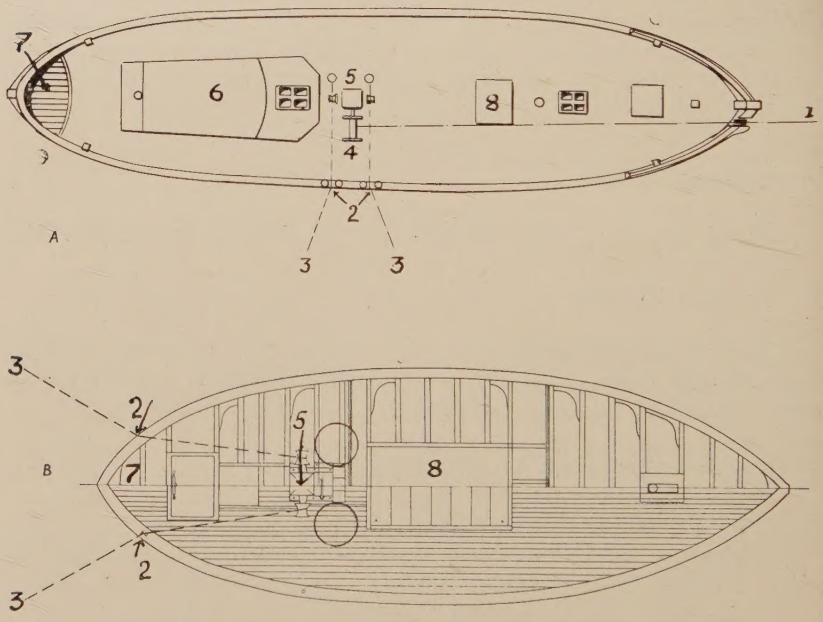
size of boat : 30-70 feet ;

engine : 15-200 h.p.

2. *Fitting Out*

(a) *The Boat.* For Danish seining a boat must have plenty of deck space for the ropes and have some sort of a platform aft for shooting the net. This platform must be quite smooth with no sharp corners and the net on running out must fall clear of the rudder. For anchor work it is usual for the winch to be placed fore and aft, and for the ropes to be brought in amidships. However, in small inshore boats the winch is often placed athwartships and the ropes brought in over the stern. Rollers are fitted in metal sockets in the gunwale to lead the ropes over the rail of the vessel. They should be fitted so that they are in a direct line with, and level or slightly higher than, the barrels of the winch.

The larger offshore boats working deep water use a combination seine and anchor winch, but the smaller inshore boats using light anchor gear have just the winch and coiler. For a small boat working in shallow water, and particularly if using an unskilled crew, a small double-barrelled, two speed winch is all that is required, the ropes being coiled by hand.



1. Anchor wire
2. Fairlead rollers
3. Seine warps
4. Anchor drum
5. Seine winch and coiler
6. Wheelhouse
7. Net platform
8. Fish room hatch

Figure 5. (*a*) deck layout of a typical North Sea seiner, using a combination seine and anchor winch with the ropes being hauled on the beam, and (*b*) deck layout of a small inshore boat without anchor winch and hauling over the stern.

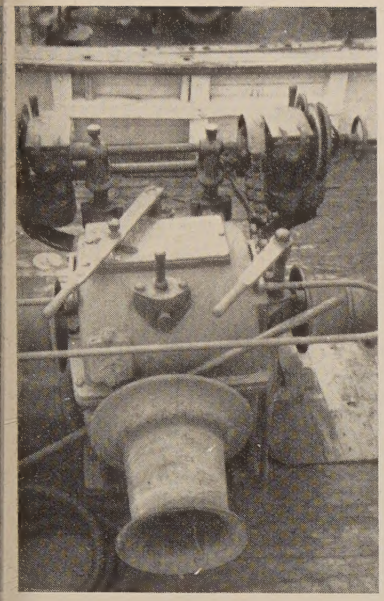


Figure 6. Medium sized winch and coiler with anchor-drum in foreground.

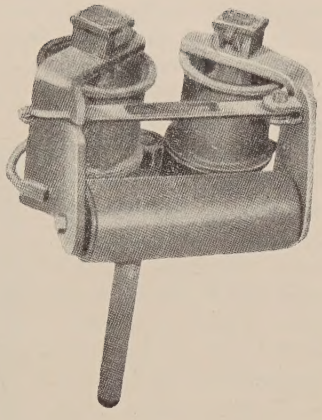


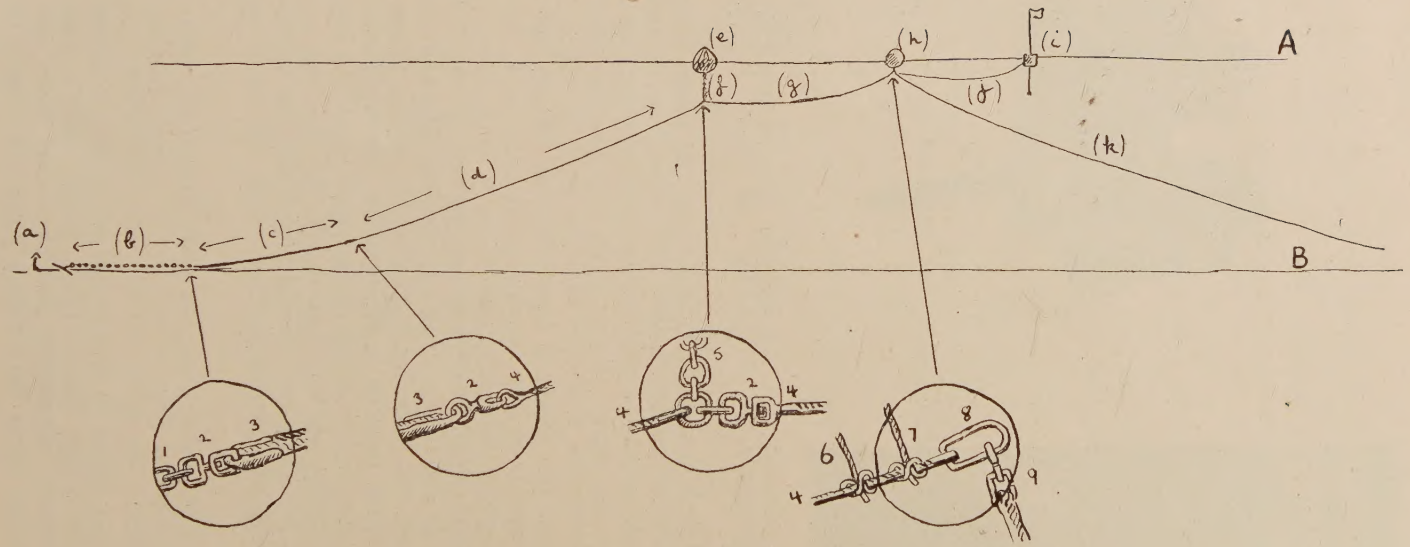
Figure 7. Seine net rope lead, or roller.

Figure 5 shows (*A*) deck layout of a typical North Sea seiner, using a combination seine and anchor winch with the ropes being hauled on the beam, and (*B*) deck layout of a small inshore boat without anchor winch and hauling over the stern. Figure 6 shows a medium sized combination winch, and Figure 7 a seine net rope lead, or roller.

When anchor fishing, the winch is invariably run off the main engine which must be capable of slow running for hours on end. For this reason the Scandinavian fishermen prefer heavy duty one and two cylinder engines. For small boats kerosene engines will do, but they must be kept hot or else the fuel will not vaporize and will run into the sump. This can be done by regulating the cooling water.

The drive to the winch may be in any manner, provided there is a clutch that can be operated from the deck. Most usual is a belt controlled by a jockey-puiley. Other requirements for the boat are a strong tackle or boom for taking the cod-end aboard and steel plates or strips of wood covering the part of the bow where the anchor is hove up.

(b) *Anchor Gear.* The anchor gear, commonly known as " moorings ", is of prime importance (Figure 8 shows a typical moorings for a medium sized cutter). As there will be a very great strain on it, the flukes must be very broad so that it will not drag. A typical Danish North Sea anchor weighs 180 lb. For smaller boats, a good improvization is an ordinary Admiralty pattern anchor with steel " spades " welded or bolted on to the existing flukes (*see* Figure 9).



A — *Surface* B — *Sea bed*

(a) Anchor
(b) 15-30 fathoms chain
(c) 15-25 fathoms coir rope
(d) 1/2 in. wire
(e) Mooring buoy
(f) 1 1/2 fathoms light chain
(g) 1/2 in. wire
(h) One or two canvas buffs
(i) Dahn buoy
(l) Picking-up piece (5-6 fathoms 2 in. rope)
(k) Seine warp

1. Anchor chain
2. Swivels
3. Grass rope-coir
4. Mooring wire
5. Light chain to mooring buoy
6. Picking-up piece
7. Strop to canvas buff
8. Mooring link
9. Seine warp connected by split links.

Figure 8. Mooring gear for anchor fishing.

From the anchor a certain amount of chain is required depending on the depth of water and the amount of rope used. One or two 15 fathom lengths of $^5/_8$ or $^3/_4$ in. chain is usual. This is in turn connected by a heavy swivel to 15 to 25 fathoms of thick (2 to 3 in. diameter) coir or " grass " rope. This rope has the quality of strength combined with elasticity so that, besides being used in fishing, it is ideal for riding out bad weather. Another heavy swivel connects this rope to the mooring wire proper which is of flexible $^1/_2$ in. diameter steel wire with a length of approximately three times the depth of the water to be worked, 50 to 100 fathoms being the length of wire usual in the North Sea. Twenty fathoms from the end of this wire, a third swivel connects it by means of a short length of light chain to the buoy or barrel which takes the weight of the moorings. This buoy may be made of iron or wood or may consist of a large rubber balloon in a canvas cover.

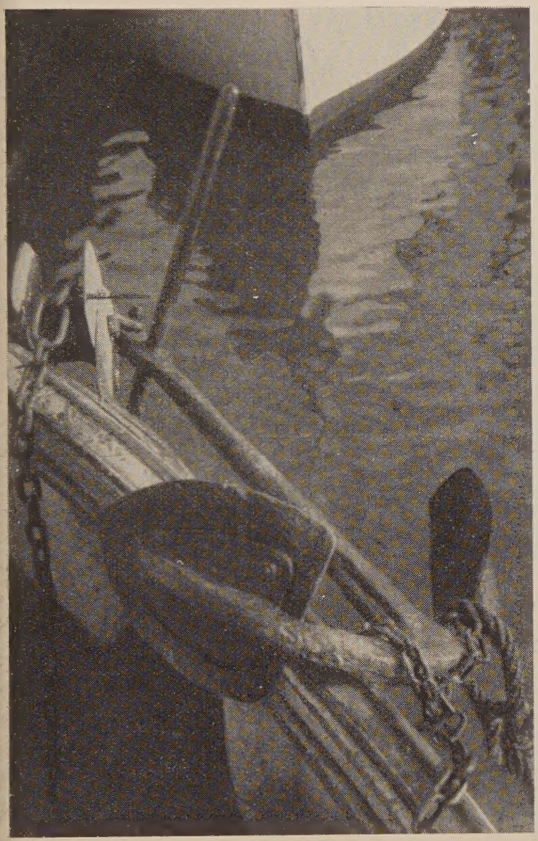


Figure 9. Small anchor for 40 ft. boat with extra large flukes bolted on.

At the end of the mooring wire is a large steel link which is used for making fast to the sliphook on the vessel. A split link is shackled into this large link to which is attached the one end of the fishing warp when shooting the gear.

In order to find the moorings again after making a set, a "dahn" or flag buoy is used and should be large enough to be seen a mile away, but light enough to be taken aboard without difficulty. It is attached to the mooring wire by a rolling hitch, just below the end link, by a 5 to 6 fathom length of 2 or 2 $^1/_2$ in. rope known as the " picking-up piece. "

The weight of the mooring link and the end of the seine rope is carried by one or two canvas herring buoys or " buffs " which are

also fastened to the mooring wire just below the link. These ropes are not attached directly to the link in order to leave it free for attaching the slip hook in a hurry when making fast to the moorings.

With large combination winches the whole anchor gear (wire, grass rope and chain) is wound on to the winch when not in use, otherwise the gear may be coiled down by hand in the bows (*see* Figure 10).

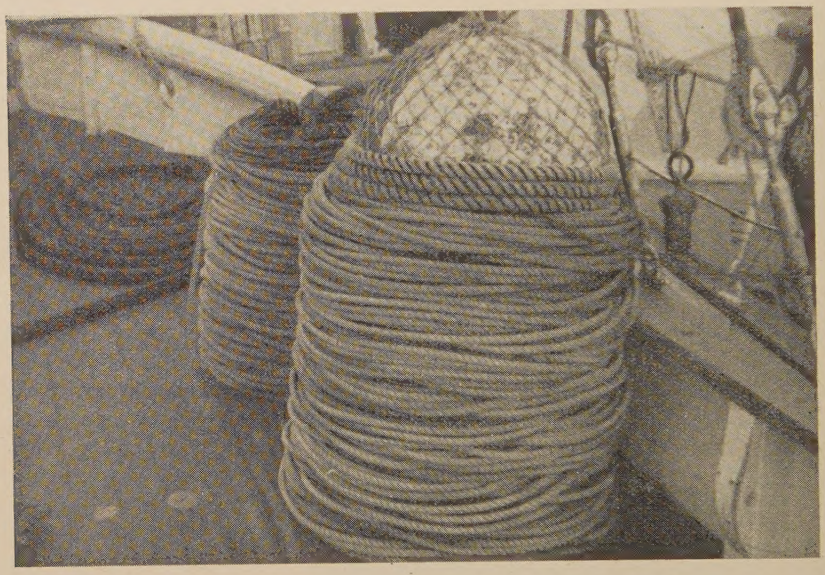


Figure 10. Ropes, anchor gear and canvas mooring buoy neatly stacked aboard a small inshore vessel.

(c) *The Ropes.* The ropes most commonly used in seining are $2\,^1/_4$ in. circumference, hard-laid manila. However, if fishing is to be carried on over a very soft mud bottom, $2\,^1/_2$ or even $2\,^3/_4$ in. ropes, may be used, as these will not cut into the mud so easily. Besides the added expense, one of the drawbacks of thicker rope is that it takes up more room. Sisal rope may be used if manila rope is unobtainable, but it does not wear as well. Similarly, medium lay will do, but it is difficult to coil in automatic coilers. Ropes usually come in coils of 120 fathoms each, and should be spliced together while still in the coils. To fit the ropes out, the coils are spaced out on the deck, half of them on one side, half on the other. The aftermost coil is taken, turned over and the inside pulled up and out from the bottom ; a split link is spliced in this, using three tucks. The second coil is taken in the same way and the inside end spliced to the outside end of the first coil. All the coils are thus joined, one to the other. The last end will be on the outside of the foremost coil ; a split link

s spliced into this. For joining the rope $2\,^1/_2$ tucks a side short splice are used. This is done by cutting out one strand from the rope for each tuck after the first two, giving the splice a taper which allows it to pass easily through the coiler.

(d) *The Net.* A net usually comes from the maker ready to fish except for the floats, as fishermen like to vary the number they put on according to their own preference. However, plaice nets are usually delivered with 10 or 12 flat corks spaced along the headline and all that is required is to add a few floats of the hollow spherical type in between, perhaps two or three in the bosom and one between every other cork float along the wings. Scandinavians usually prefer glass floats, the English and Scots, metal ones.

Dimensions and specifications of a typical plaice net might be as follows :

wings : 14 fathoms, $5\,^1/_2$ in. stretched mesh, 12 thread cotton ;
belly and cod-end : 6 fathoms $4\,^3/_4$ in. stretched mesh, manila ;
headline and leadline : $1\,^1/_4$ in. tarred hemp ;
fishing height at end of wing : 2 feet ;
fishing height at bosom : 14 feet.

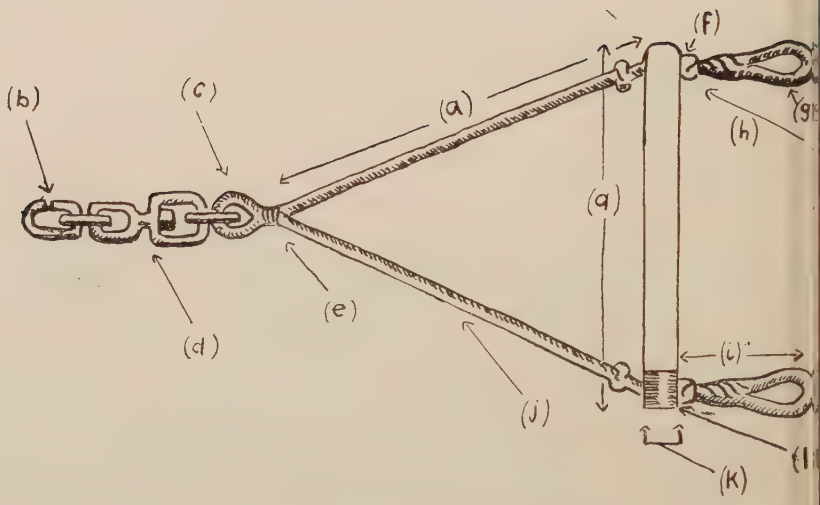
It is common practice to attach either a light grass rope in bights to the leadline to prevent it cutting too deeply or to reeve it loosely through each hanging. At the same time one fathom lengths of $^1/_4$ in. chain are often attached in one or two places along the wings and in the belly to make sure that it " tends " the ground properly. The chain should never be reeved through the hangings, as it will rust and break them, but put on in slack bights so that it hangs clear of the cotton.

Dan Lenos are used for attaching the net to the ropes and are made of wooden poles $2\,^1/_2$ feet long x $2\,^1/_2$ in. diameter, with an iron band $2\,^1/_2$ in. wide x $^3/_8$ in. thick fitted on one end. A sketch of one of these is shown in Figure 11.

The head rope and the foot rope should be tied to the eye splices in the Dan Leno in an identical manner so that they pull evenly.

Operating the Gear

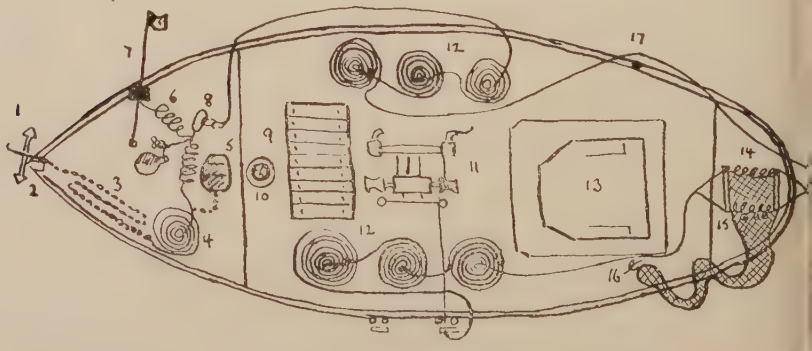
(a) *Setting out the Gear for Shooting.* The net is laid out on the stern platform so that it will run out while the boat is traveling at speed. The lead line is coiled down on the side towards which the boat will be turning when making the set and the head line on the other. Assuming the set to be made to starboard means that the left hand wing of the net must be flaked down first so that it may come off last. The net is usually stacked by two men, one coiling down the head line and the other the lead line. When the belly is reached, it is taken and flaked out along the gunwale with the cod-end which is thrown out by hand at right angles to the wings as the net is being shot. Next, the other wing is coiled down and the



(a) 2 ft. in.
(b) Split links
(c) Thimble
(d) Swivel
(e) Whipping
(f) Knot
(g) Eye Splice
(h) Hole bored or burnt through Dan Leno
(i) 8 in.
(j) $2\frac{1}{4}$ in. rope
(k) $2\frac{1}{2}$ in.
(l) 9 iron band 3 in. wide $\times \frac{3}{8}$ in. thick

Figure 11. Details of Dan Leno construction.

second Dan Leno is laid down near the after edge of the platform s that it will run off without hindrance. If in doubt as to which wing are which, or whether there is a turn in one or not, one shoul always start from the bosom of the net and work out along the wir from there and then, when clear, start stacking.



1. Anchor
2. Heavy roller in bow
3. Chain
4. Mooring wire
5. Mooring buoy
6. Picking up piece
7. Dahn buoy
8. Mooring link
8a. Buff
9. Fish hatch
10. Mast
11. Winch coiler
12. Coils of rope
13. Wheelhouse
14. Lead line
15. Head line
17. Stanchion

Figure 12. Sketch showing the whole gear ready for shooting

Now the first end of the starboard set of ropes is taken and, ·ing sure to lead it outside the rigging, it is taken forward and clipped) the split link on the mooring link. Then the last end of the same ·pe is clipped to the Dan Leno that is to run out first. The first ıd of the port set of ropes is now attached to the other Dan Leno, ıe other end put on one of the winch drums, the cod-end tied up, ıd the gear is ready for shooting.

Figure 12 is a sketch showing the whole gear assembled ready for ıooting. For the sake of clarity only three coils of rope on each de are shown.

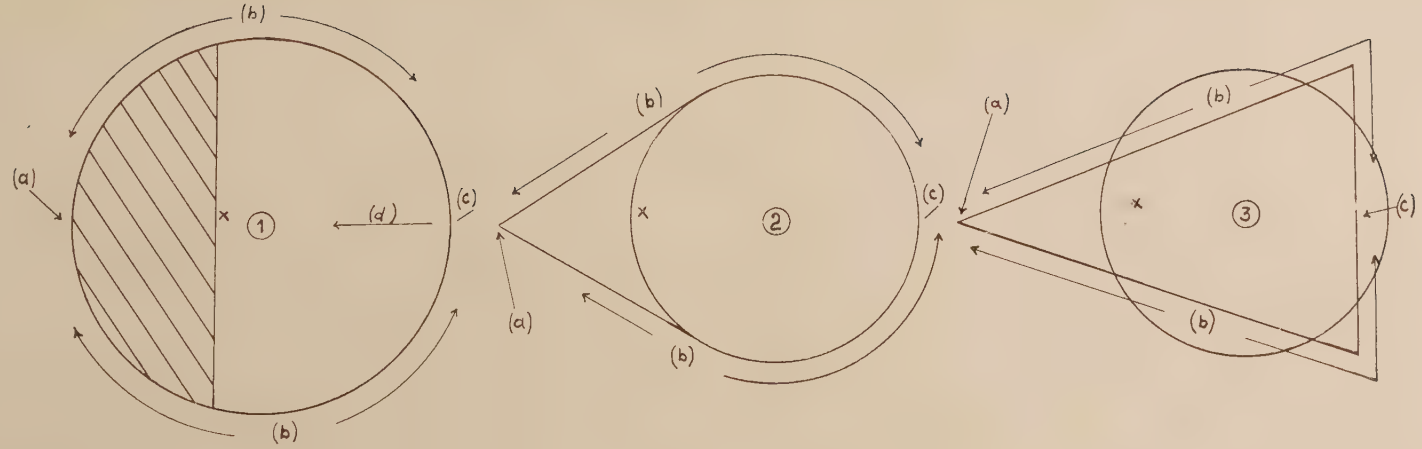
(b) *Shooting the Gear.* The main question is in what sort oi ıape to shoot the gear. Obviously, the largest area that can be ·vered with a given circumference is a circle [*see* Figure 13 (1)]. Thus, ıeoretically, shooting the ropes in this fashion would catch the most ·sh.

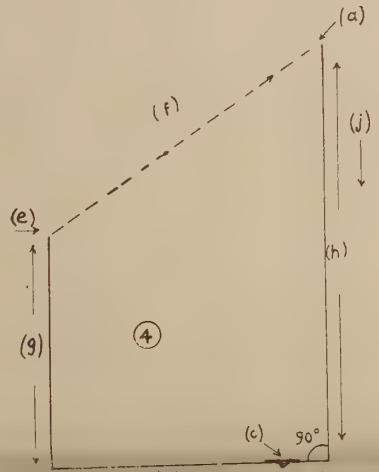
However, according to the depth of the water, strength the tide and speed of winching, the net will close when still some ıistance from the boat, for instance, at X in Figure 13 (1). Thus, ıl the area shown shaded is wasted. Obviously, therefore, the larger ıart of the area to be covered must be some distance from the boat. a rather smaller circle is started, not at the boat but at point X, ıd that circle joined to the boat, the ideal shape is obtained [*see* igure 13 (2)]. However, as it is extremely difficult at sea to steer curved course accurately, straight courses and sharp turns by com- ass are preferred and the ideal shape becomes a triangle [*see* igure 13 (3)].

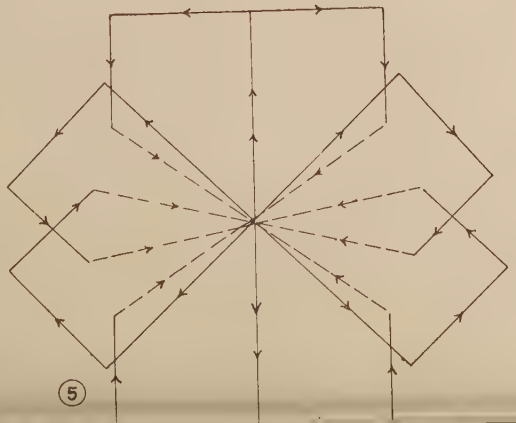
The Danes, however, when fishing for plaice, have developed a ·t that enables them to cover more ground with the same amount f rope. This is done by using one warp as a gigantic sweep [*see* igure 13 (4)]. The method is to shoot 9 coils straight down with the de, then turn 90°, shoot the last coil, shoot the net, shoot 5 coils, ırn 90° and shoot the remaining 5 coils. Then the warp is towed owly towards the dahn at about $1\,^1/_2$ or 2 knots. The rope will hen drive the fish in towards the other rope and a greater area is hus fished.

There are many variations to this type of set ; skippers have heir own ideas on the exact shape in which to shoot the ropes, and his is often dependent on the nature of the ground and the state of he tide. Since, whenever possible, a set is made so that the net is ·inched back through the tide, the main thing to be kept in mind s to shoot nearly all the ropes down with the tide, turn 8 points nd shoot the last coil or so and the net across the tide and then se the remaining ropes as a long arm to gather the fish in. Some oats, using fifteen coils a side, may take $1\,^1/_2$ hours to tow back to he moorings. A tip to remember when towing back to the dahn s always to keep well " outside " of it in order to keep the " arm " pen and prevent the net from closing too soon.

A systematic method of fishing from an anchor, known as " Star inging, " is shown in Figure 13 (5). This consists of making eight







(a) Moorings
(b) Rope
(c) Net
(d) Course of net
(e) End of warp
(f) Tow
(g) 5 coils
(h) 9 coils
(i) 1 coil
(j) Boat's course

sets from the same mooring, each set being made on a 4 points difference in course from the preceding one, so that the area round the moorings is completely swept. Notice must be taken of which way the tide swings when it changes so that the hauls may all be made through the tide as nearly as possible. When all the sets have been made the anchor is moved two warps lengths away and the process repeated. This results in very intensive fishing in a given area.

The total *length of rope* to use varies considerably, but for anchor work 5 coils a side are generally accepted as a minimum, 17 as a maximum with 10 or 12 as an average. Some of the factors that may be borne in mind are :

(*i*) The size of the boat and power of the engine. Obviously the quantity of rope must be in keeping with the deck-space and horsepower available.

(*ii*) The nature of the ground to be worked. If there are "fastenings" or wrecks in the area it is advisable to work with fewer ropes than usual so that a set may be made in between them without coming fast.

(*iii*) The amount of fish in the area. Plaice being very heavy, it is extremely difficult to split a large bag of them and it is not desirable to get more in the net than can be taken aboard in one haul.

In order that the amount of rope to be used may be altered easily without cutting and splicing each time, it is usual to splice a minimum number of coils together each side — say five or seven — and to join on the rest, either individually or in pairs, with split links, so that it is only a moment's work to connect up or disengage the required number.

Having decided on the direction in which the gear is to be shot, the anchor is let go and the moorings paid out in the direction towards which the rope will be shot. The barrel and dahn are let go and, holding fast to the seine rope the boat is allowed to steam slowly until headed in the required direction and the anchor gear comes fast. The rope is let go and the boat allowed to steam off, letting the rope run out of the coils. On shooting from new coils one should go slowly, but once they have been stretched and coiled they can be shot at full speed.

The coils must be watched carefully and the crew must keep out of the way, as sometimes men get caught in a coil and are dragged overboard. A sharp knife or axe should always be kept handy so that, if a man should go overboard, the rope can be cut. If the rope entangling him is slack, he has a chance to free himself, but if it has a strain on it, he has little hope. An iron bar with a short piece of piping around it should be fixed in the gunwale, so that the rope may run out on the outside of it, clear of

anyone working on the deck (*see* Figure 14). If some of the rope goes over the side in a tangle, it should be let go and then bound back against the bar to pull it out. If it does not pull out, the boat must be stopped and the tangle taken out then and there, for to try to do it when hauling is extremely difficult owing to the great strain on it. Besides, to stop the winch at the crucial moment may well spoil the set.

Figure 14. Shooting the ropes. Note iron bar with piping roller used to keep ropes clear of workers.

Before all the rope has run out, the bar must be lifted out otherwise the net will be pulled around it instead of running off the stern. When coming to the net, the boat must be slowed down to four or five knots and two men must hold the cod-end between them. When the first wing has run out the cod-end is thrown out at right angles to the boat as far as possible (some leads or a piece of chain are often attached to the end of the cod-end to take it down clear of the rest of the net). When the last wing has run out the Dan Leno is held for an instant to straighten the net, but let go as soon as the strain comes on. Then the shooting is continued. Just before all the rope is out, the boat is slowed down before starting to tow in to the dahn, so that the weight of the boat does not suddenly throw an excessive strain on the warp and part it. When all the rope is out, one tows either from the winch or, if inconvenient, from a cleat or samson post aft. On reaching the moorings, the dahn buoy is taken aboard and the picking-up rope heaved in until the mooring link is reached. The seine rope is detached, lead through the remaining fairlead roller and, put on the winch. Four turns are usually taken on the barrel. The link is made fast to the slip hook on the vessel. The boat is now on the mooring and the gear ready to haul. If difficulty is found in detaching the seine rope, one makes it fast, tows up against the tide, stops and allows the boat to drift back, when the seine rope will become slack and may be easily detached.

(c) *Hauling.* There can be no set rules as to how fast to haul or when to speed up the winch, but the description given in Figure 3 is a fair guide. When hauling is first commenced, with the winch in bottom gear, the ropes will be pointing away from each other at a wide angle (*see* Figure 15) which gradually decreases as the area

enclosed by the rope diminishes. In the early stages the fish are being herded into the center and time should be allowed for them to keep ahead of the ropes as they sweep over the sea bed. As the haul proceeds, the lateral or herding movement of the ropes diminishes and the speed of the net towards the boat, which might be termed the collecting movement, increases. Thus, at first the wide angle between the ropes will close rapidly and then the rate of closing will

Figare 15. The ropes coming in during early stages of hauling. The roller shown are of a patent balancing type.

be slow. As this angle narrows, the speed of the winch should be gradually increased until, when the ropes are nearly parallel and the net almost closed, the gear should be coming in at top speed.

It is most important that the two wings of the net are exactly level when it closes as, if one is far ahead of the other, the fish will be lost. To ensure that they are level, the length of the two warps, particularly in the latter stages of hauling, must be kept identical. As one winch barrel often hauls a fraction faster than the other, and as one warp may be stopped momentarily for some reason or other, it is necessary to level them up by slipping the clutches on the coilers without stopping the winch. Bringing the splices even is insufficient, as the individual coils often vary in length by as much as a fathom or one warp may become stretched through being caught on a "fastening."

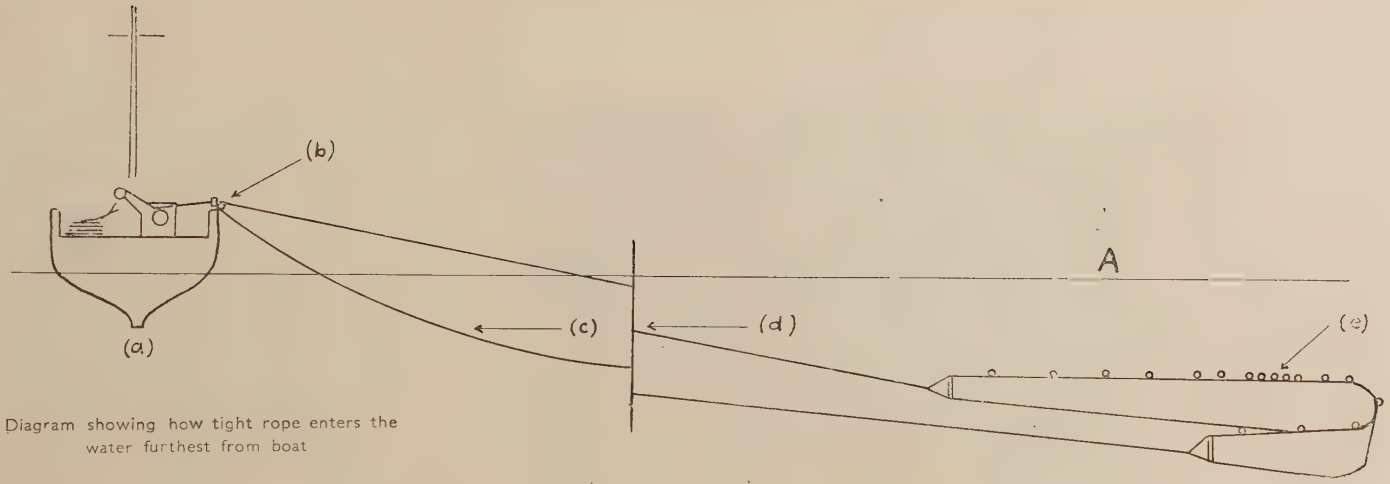
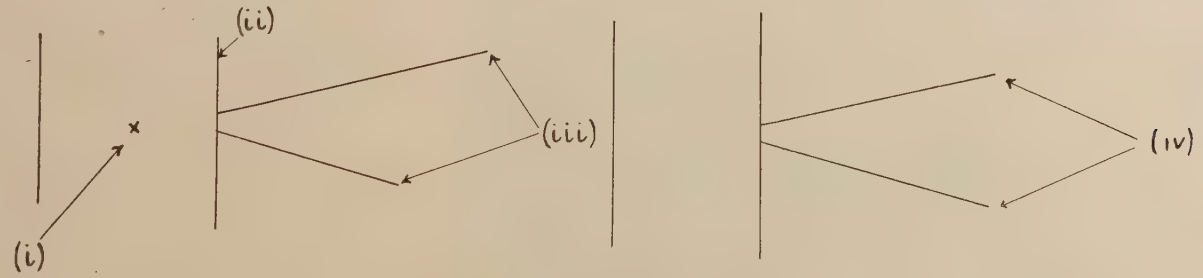


Diagram showing how tight rope enters the water furthest from boat



Plan view of above

(a) Boat
(b) Fairlead roller
(c) Slack rope
(d) Tight rope
(e) Bosom of net

A - Water level

Showing ropes pulling evenly

(i) Position to judge ropes
(ii) Ships side
(iii) Ropes enter water here
(iv) Ropes enter water equidistant from vessel

Figure 16. Detection of uneven hauling of warps

Nevertheless, with a little practice it is possible to judge by eye quite accurately whether the warps are coming in evenly or not. Figure 16 shows how one of the ropes, being shorter, is more rigid and therefore cuts the water further away from the boat than the other. To level them the crew member stands behind the rollers at the apex of the angle formed by the two warps and slips the clutch on the warp that is highest until they both enter the water symmetrically. In this way one can usually bring the Dan Lenos up within a few inches of each other. The tension on the ropes is also a good pointer as to whether they are pulling evenly or not, and can be judged by standing between them and pressing down with either hand as they come over the rail.

When starting out with this method of fishing, and before one becomes accustomed to judging the ropes by eye, a very sound method is to take them ashore, stretch them out length for length, and mark them every 50 fathoms either with a whipping or with paint. However, marking never stays very long because the ropes often stretch and, in addition, the marks are put out of line whenever one of the ropes has to be cut and respliced.

While the ropes are coming in, an eye must be kept on the splices as they go through the coiler and if one jams, it must be freed with a pull from below. New splices frequently stick, but run through easily as they become worn. If a weak place is noticed in a rope, e.g., a strand is gone, it should be cut and respliced before the next haul.

For taking the coils away from under the coiler an old piece of rope about 3 or 4 feet long is useful. It is laid down under the coiler so that one end is in the middle of the coil and the other outside. Then when a stack of coils about 9 in. high has been built up, by picking up the two ends of the rope the coil can easily be dragged away and stacked in vertical piles.

If the sequence of shooting and hauling is thought out it will be found that the first warp to be shot is reversed each time a set is made and therefore, in order that its marks may tally with those on the other warp, it will have to be turned back again before shooting. Figure 17 shows a member of the crew dragging away the coils and standing them up on edge so that they may be turned over easily before the next set.

Marks should be put on the ropes 25 fathoms from the net in order to give warning of its approach. When these are seen, the winch must be slowed gradually so that the net does not come up with a rush, and stopped a little before the net reaches the side of the ship.

The net should always be taken in over the stern. This means that, when hauling amidships, the ropes will have to be detached from the Dan Lenos and the net led aft. This may be helped by giving the boat a " kick " ahead and then pulling in the slack as she drops back. With strong tides this may be repeated many times, making the net fast aft, going ahead and then dropping back and taking the net in, but if the tides are slack this maneuvre is unnecessary.

Figure 17. One set of warps being stacked on edge so that they may be easily reversed for the next set.

When the size of the crew allows, one man should take the head line and one the foot rope of each wing, and with practice it will be found possible to lay one wing down ready for shooting again at the same time as it is being hauled in.

The cod-end is taken aboard by putting a strop around it and heaving up with the tackle, as in trawling. A large bag of flatfish may sometimes be split by making it fast to the stern and putting the engine slowly in reverse, when the wash from the propeller will bring the fish to the surface, enabling a splitting strap to be put around the cod-end.

Shooting can begin again immediately the one side of the rope has been turned and the ropes correctly reconnected with the Dan Lenos. The net can be made ready on the stern platform while the first warp is running out. The fish may be gutted during the early stages of the next haul when the ropes are coming in very slowly and do not need much attention.

The gear is bound, sometime or other, to get caught on a rock, wreck, anchor, or the like. This will be evidenced by one of the ropes becoming tight and the winch laboring. When it is no longer safe to winch, one should release the anchor and winch back over the fastening, which will usually clear the gear. However, it sometimes happens that on foul ground both ropes come fast. In that case, after letting go the anchor, one may find that the ropes are winched back to a point where they are both stretched in opposite directions. In this case one rope is cut, preferably at a splice, a dahn put on it and let go. Then one winches back over the other rope and so right around.

4. *Variations*

While flatfish are the type most usually caught by boats using the anchor technique, it is also used by Scandinavians to take cod and haddock. Haddock nets are similar in construction to plaice nets except that the mesh is slightly smaller throughout and the net is made entirely of cotton with fuller wings and bosom, resulting in a very much higher opening of the headline.

For catching round fish with an anchor one does not tow the warp to the anchor, but makes a triangular set as shown in Figure 13 (3). Round fish move much faster than flatfish, the gear must come in more quickly, and winching must be as fast as possible all the way.

B. Fly-dragging

This is the type of Danish seining used by all the Scottish boats and, to a lesser extent, by the Irish and English. Instead of anchoring, the boat steams ahead and winches the gear in at the same time.

The advantages are that the net moves faster over the ground, thus being more effective for round fish, also that sets are made more quickly and the shifting to different areas facilitated as the cumbersome anchor gear is entirely eliminated.

On the other hand, this method is recognized as being inferior to anchor work for plaice and it is also hard to cover an area as systematically as with star ringing. Lastly, it is more costly on fuel as the propellor of the boat has to provide the pull against the hauling of the gear otherwise exerted by the anchor. A typical Scottish seiner is shown in Figure 2.

1. *Conditions Necessary for Successful Operation*

These are the same as for anchor fishing, except that an engine of at least 30 h.p. is required. A powerful modern 60 ft. boat would need between 100 and 150 h.p.

Figure 18. Triple roller rope lead for winching in both ropes on the same quarter.

Figure 19. Deck lay-out of a medium-sized fly dragger.

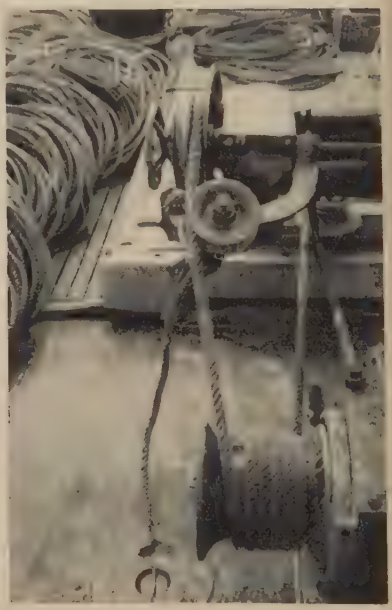


Figure 20. Looking aft from the winch with the rope on the drum ready for hauling.

2. *Fitting Out*

(a) *The Boat.* For fly-dragging, as the boat will be steaming ahead, the gear must come in over the stern, with either one warp coming through a roller on each quarter, or both coming through a single roller on one quarter. This is preferred as it is much easier to keep the ropes level if a single roller is used (*see* Figure 18). The winch and coilers, which are usually lighter than the Danish type and naturally without an anchor drum, face either directly forward or directly aft. In the United Kingdom, the most usual installation is forward, facing aft, with the ropes being led inside the arc of the coilers by the vertical rollers in front of the winch (Figures 19 and 20 show a typical installation). The drive is usually by belt from a shaft running forward under the fish room floor.

(b) *The Ropes.* These are spliced together or connected with split links in exactly the same way as described before. The exact size of the ropes again depends on the ground, the softer the bottom the thicker the rope; $2\,^1/_4$ in. diameter is the most usual. The number of coils of rope to use on each side is largely dependent on the towing power of the boat. A rough guide to the amount of rope that might be used is as follows:

for a boat with an engine of 40-50 h. p.: 5 coils a side;
for a boat with an engine of 60-70 h. p.: 7 coils a side;
for a boat with an engine of 80-90 h. p.: 9 coils a side;
for a boat with an engine of 130-140 h. p.: 11 coils a side.

Most of the bigger Scottish boats work between 7 and 10 coils, according to their power and the ground, i.e. more rope on sand bottom, and less on mud because of its greater resistance.

(c) *The Net.* Scotch nets for all round fish are termed haddock nets and are made entirely of cotton, treated with green cuprinol. Dimensions and specifications of a typical haddock net might be as follows:

wings: 17 fathoms of 4 in. stretched mesh, cotton;
belly and cod-end: 9 fathoms of 2 in. stretched mesh, cotton;
headline and leadline: $1\,^1/_4$ in. combination wire rope or $1\,^1/_4$ in. tarred hemp;
fishing height at bosom: 3 fathoms.

Nets are manufactured usually with leaded foot rope attached, but without floats. In order that the headline shall lift as high as possible a large number, commonly 40 to 50, of 5 in. floats are used, most of them at the bosom and the rest spaced out at gradually increasing intervals along the wings.

A 3 in. leaded grass rope is attached to the foot rope by short, 2 to 3 in., cotton stops and the number of floats should be adjusted so that this rope just tiptoes along the bottom. For instance, if flatfish are taken when fishing for whiting, more floats should be added.

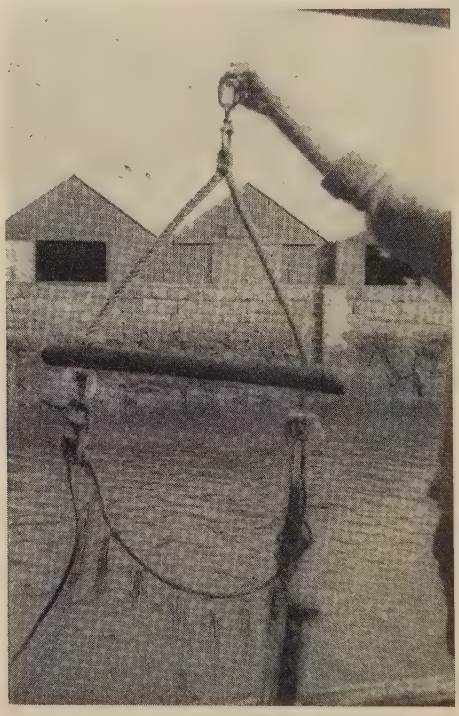


Figure 21. Showing attachment of haddock net to Dan Leno. Note headline is tighter than footrope.

Plaice nets for fly-dragging are similar to the Danish plaice nets already described, but are generally of lighter construction and made entirely of cotton.

With fly-dragging the net is towed so that the strain comes mainly on the head line. The net should therefore be joined to the Dan Lenos so that the head line is 6 inches tighter each side than the footrope (*see* Figure 21). Owing to the great strain put on the head line, it has become usual to make this of combination wire rope or, if it is made of tarred hemp, to lash such a rope alongside to strengthen it.

Another innovation (*see* Figure 22) is a new type of Dan Leno, said to be very effective in mud, as it does not dig in. This is made of combination wire rope and a wooden hoop.

3. *Operating Gear*

(a) *Setting out the Gear for Shooting.* The ropes and net are laid out as before (*see* Figure 23) and the only picking up gear necessary is a light dahn-buoy that can easily be taken aboard, and a canvas " buff ". The end of the first rope to be shot is clipped to the dahn, and about two fathoms away, four or five single loops are tied to the buff to provide slack for attaching to the winch when it is picked up (*see* Figure 24).

(b) *Shooting the Gear.* In fly-dragging, the rope is never towed back to the dahn, but the set is made to try and reach it exactly as all the rope runs out.

A typical set using eight coils a side might be : 6 coils shot straight, turning 9 points, shooting the last two, the net and the first two coils

Figure 22. New type of Dan Leno consisting of a wooden hoop and combination wire rope. This is used on mud bottom as it does not cut in.

of the next side, and then turning and shooting the remaining 6 coils while running for the dahn.

The gear may be towed either with the tide or through it, but in all cases with the wind whenever possible. Towing slowly with the tide is the most effective method for flatfish, while round fish are most commonly taken against the tide. When the direction of the set has been decided upon, the boat sets off and the dahn and buff are thrown over at full speed. The rest of the gear is then shot as usual. When making a set allowance must be made for the wind and the tide, otherwise the dahn will not be reached accurately. Any rope remaining should be dumped over board before the dahn is reached.

For picking up the dahn a small grapnel is most useful, and should be thrown between the dahn and the buff.

(c) *Hauling.* When both ropes are on the winch, the gear is towed so that the boat moves over the ground at about 2 to 3 knots. After perhaps 5 minutes the winch is put in low gear, so that the boat will move over the ground at about 2 knots. When one-third of the ropes is in, the winch is put in middle gear, thus reducing the speed of the boat to approximately 1 knot. When two-thirds of the ropes are in and they are nearly shut, the winch is put in top gear. The boat will now be almost stationary, while the net is coming in fast. In some cases, with a very fast winch, a boat may even go astern over the ground during the last stages of hauling. A typical fly-dragger with a 4-speed winch, and using 8 coils a side, would tow from 5 to 10 minutes and then take in approximately 2 coils in each gear.

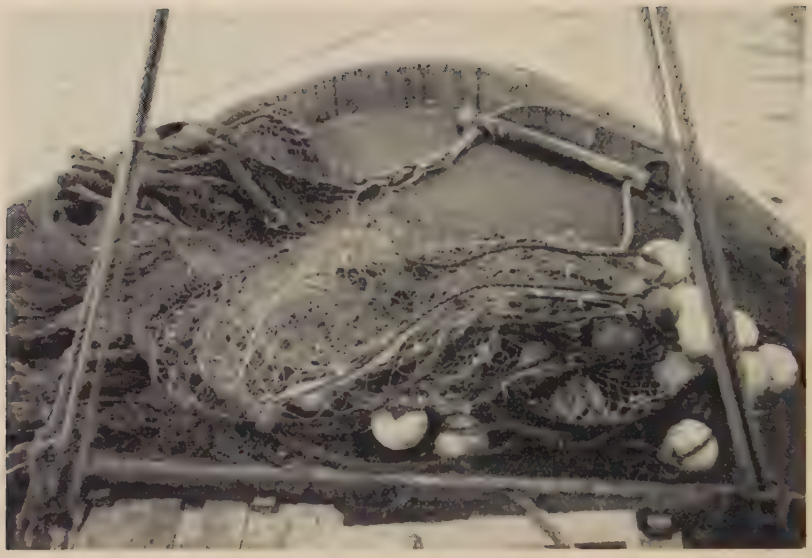


Figure 23. Scottish haddock seine net laid out on stern platform ready for shooting.

Figure 24. Dahn buoy, buff and seine rope ready for "letting go".

The above is only a rough guide as there can, of course, be no set rules on how fast to haul or when to change gear with the winch, as the rate at which the net closes is dependent on the power of the boat, the tide, the nature of the bottom, and the size of the meshes

in the net. It may often happen that the net closes by the time only half the ropes are in. The main point to bear in mind is that the gear should be kept moving over the ground all the time, and the rate of hauling increased as the angle between the ropes decreases, until top speed is reached as the ropes come together.

In conclusion it might be well to state again some of the advantages as well as some of the drawbacks of Danish seining. This method, when used in favorable circumstances, has proved to possess a far greater catching-power than trawling from a vessel of similar size. Indeed a North Sea seiner will often out-fish a very much larger steam trawler, particularly for plaice and other prime fish. Not only is the weight of fish caught frequently greater, but the quality and subsequent market value is also higher. In addition, the savings in capital outlay, man power and fuel consumption for the seines compared to the trawler are very considerable.

On the other hand, a trawler can fish under conditions of weather, tide and ground that would prevent the use of the Danish seine, whilst another great advantage possessed by the trawler is its far superior searching power. When looking for fish this type of vessel can make a short haul and, if results are not promising, she can steam to a new area and drop the net again, repeating this operation until fish are found.

To make a set with a seine net is necessarily a lengthy business which in anchor fishing also involves the laying down and picking up of moorings ; if no fish are taken much time is wasted. For this reason the Scandinavian boats frequently adopt the fly-dragging technique when prospecting the ground and revert to moorings on striking fish.

Lastly a word of encouragement to anyone trying out the use of this gear for the first time. This is a skilled method of fishing which, when properly used, will bring good results, but it takes time to learn. Success is seldom obtained immediately but each set made is experience gained and as in most types of fishing it will be found that perseverance pays off.

Alan Glanville

FISHERIES RESEARCH CENTER ESTABLISHED IN SPAIN [1]

The Fisheries Research Institute [Instituto de Investigaciones Pesqueras] is a new organization established under the Supreme Scientific Research Council, and forms part of the "Juan de la Cierva" Technical Research Foundation. The activities of the Institute began in the middle of 1949 under the direction of Dr. Garcia del Cid, Professor of Barcelona University; and in July 1951 it took possession of an estate at Vigo where its Atlantic Laboratory was officially inaugurated in September 1952. It now has other laboratories at Blanes, Vinaroz and Castellón on the Mediterranean coast. The theoretical part of a training course for scientific personnel with which the Institute was to carry on its work was initiated in the Zoological Laboratory

of Barcelona University. The course was conducted under the direction of Dr. Margalef, Director of the Baleares Oceanographic Laboratory, and the present Director of the Vigo Atlantic Laboratory of the Fisheries Research Institute. The practical part of this course was undertaken in a laboratory installed in the botanical gardens at Blanes.

Vigo is universally known for its fishing tradition and up-to-date port installations. Spain occupies the third place among fishing countries of Europe and seventh in the world. Of the 600,000 metric

[1] Information supplied by Dr. B. Andreu, Director of the Atlantic Laboratory of the Fisheries Research Institute.

tons of fish (according to most recent statistics) landed at the 200 Spanish ports, 75,000 metric tons were landed at Vigo. This is 16.5 percent of the total Spanish catch ; and 17 percent of the population of Vigo live by fishing, without counting by-product industries. Thus, Vigo offers the new Center an excellent field for technical research on fishing problems.

The new laboratories are located in a stone mansion situated in the lower part of an extensive estate 25 meters above sea level and very close to the fishing port. The building has four floors. The ground floor is used for storing equipment and fishing nets, the first and second for research laboratories, whilst on the top floor are living quarters for the technical staff. The distribution of the laboratories, the furniture and lighting arrangements, has been made to provide the research worker with the necessary comfortable working conditions. The new Center has biological, planktological, bacteriological, histological and chemical laboratories, a dissecting room, a photography room, and a lounge and extensive library. A laboratory has been set aside for foreign research workers wishing to study marine biology or chemistry in Spanish waters, as well as to engage in collaborative work.

The Institute of Fisheries Research publishes the results of its work in " Publicaciones del Instituto de Biología Aplicada " [Publications of the Institute of Applied Biology] and other specialized reviews in various countries. In little more than three years the Institute has published some fifty scientific communications besides a volume entitled "Introducción al Estudio del Plancton Marino" [Introduction to the Study of Marine Plankton], by Dr. Massuti and Dr. Margalef. This work was intended to meet the need for a practical textbook for regular courses of study on the distribution of plankton and the contents of the alimentary tract of fishes.

The work entrusted to the new Vigo Laboratory consists mainly of the study of the pilchard from a biological and technological standpoint, and of other industrial fishes, such as anchovy, sprat, albacore, hake, etc. ; specific and quantitative productivity of plankton ; ecology of mollusk beds and their restoration by laying down culture beds ; ecology and reproduction of littoral algae ; and other problems connected with the fishing industry.

Hitherto, investigations at sea have been made in fishing boats or with the help of fishermen, but the laboratory will shortly have at its disposal a vessel especially equipped for research on the high seas and a small motor launch for work in the estuarine waters.

Correction. *FAO Fisheries Bulletin*, Vol. 6, No. 1/2, p. 22, paragraph headed *Method* 2. " 0.8 liters formic acid (50%) " should read " 0.8 liters formic acid (85%). "

Conferences and Meetings

Institute of Biology

The Institute of Biology (Tavistock House South, Tavistock Square, London, W.C. 1) is arranging a two-day symposium on "The Biology and Productivity of the Sea" at the end of September 1953. The program is being planned to include the chemistry and physiology of organic production; the measurement of the rate of organic production; ocean fertility in relation to world oceanography; methods of investigation of marine organisms; distribution of marine organisms; marine algae and their exploitation; marine phytoplankton and their exploitation; food chains; demersal fisheries; unexploited fisheries; whales and seals; shellfish, crustacea and sponges; the use of fertilisers and the direct harvesting of plankton; colonial fish farming. Dr. D. B. Finn will present a paper on world food problems and the sea's contribution to their solution.

Eighth Pacific Science Congress

This Congress will take place in Quezon City, Philippines, from 16 to 28 November 1953. It will be conducted within the scope of the seventeen standing committees of the Congress which include, of special interest to fishery workers, committees on meteorology of the Pacific, oceanography (with sub-committees on fisheries, biological and physical oceanography), and systematic zoology. There will be various symposia, including one on physical and biological oceanography (sponsored by UNESCO) and one on Pacific oceanography.

International Association of Limnology

The Twelfth Congress of the Association will be held at Cambridge and Windermere, England, from 20 to 30 August 1953. The Congress will assemble at Cambridge for the reading of the papers, which will be grouped in two main sections dealing with theoretical and applied topics respectively. The theoretical section will include papers on "Water Movements and Exchange Processes in Lakes;" "The Introduction of Foreign Species;" "Historical, Ecological and Genetical Aspects of Distribution;" "The Growth and Control of Algal Population;" "Productivity." The applied section will include papers on "Pollution and its Effect;" "Waterworks Problems

Water Purification, Pollution and Toxicity." Excursions are planned for participants in both groups. On 26 August, the Congress will divide into two parties for the journey to Windermere, where further excursions will be made, including a visit to the Windermere Laboratory of the Fresh Water Biological Association. The official languages of the Congress will be English, French, German and Italian.

W. H. Schuster will represent FAO. Further information can be obtained from the Hon. Secretary, H. C. Gilson, The Ferry House, Ambleside, Westmorland, England.

Fisheries Division Activities

International Fishing Boat Congress

Invitations to the Congress were sent out in March to governments, international organizations and technical societies and, in April, to personal contacts. Up to the second week in May, 30 registrations from the private industry and naval architects had been received for the Paris meeting (12 to 16 October) and 25 for the Miami one (16 to 20 November).

Among the participants might be mentioned Professor G. Kempf (Germany); Professors H. E. Jaeger and W.P.A. van Lammeren (Netherlands); and Professor George C. Manning and Dr. F. H. Todd (U.S.A.). A number of well-known naval architects, such as John Tyrrell (Eire), E. R. Gueroult (France), Hans K. Zimmer (Norway), M. G. Duff (U.K.), and Howard Chapelle, A. de Fever, David W. Dickie, H. C. Hanson, Walter G. McInnis, George C. Nickum, Philip Rhodes, Dwight S. Simpson, Olin J. Stephens II (U.S.A.), to mention only a few, have sent in their registrations. A great many more naval architects are also considering participating in the Congress.

General Fisheries Council for the Mediterranean

Since its inaugural meeting in Rhodes, 21-24 July 1952, where rules of procedure and a general program of work were defined, the General Fisheries Council for the Mediterranean has regularly developed its activities.

The Executive Committee, which also acts as a Publication Committee, has met three times and the next meeting is planned for June 1953. This Committee is composed of Professor Jean le Gall (France), Chairman of the Council; Christos Serbetis (Greece), 1st vice-chairman of the Council; and Tonko Šoljan (Yugoslavia), 2nd vice-chairman of the Council.

On the invitation of the Italian Government, the next annual meeting of the Council will be held in Rome from 26 to 29 October, 1953.

Technical committees have been established within the Council and their composition is as follows :

A. Exploration Committee

Egypt	Dr. Ibrahim Abu Samra, Director, Institute of Hydrobiology and Fisheries, Alexandria.
France	Professor J. le Gall, Director, Office scientifique et technique des pêches maritimes, Paris.
Greece	N. Sperantzas, Department of Fisheries, Ministry of Industry, Athens.
Israel	O. H. Oren, Sea Fisheries Research Station, Caesarea ; Dr. Karl Reich, Hebrew University, Jerusalem.
Italy	Professors G. Brunelli and C. Maldura, Central Laboratory of Hydrobiology, Rome.
Yugoslavia	Dr. Tonko Šoljan, Director, Institute of Oceanography and Fisheries, Split ; Professor Josip Plancic, Director, Institute of Fresh Water Fishing, Zagreb.

B. Production Committee

Egypt	Ahmed Raafat, Technical Assistant, Institute of Hydrobiology, Alexandria.
France	A. Alloy, Director of Marine Fisheries, Ministère de la Marine Marchande, Paris.
Greece	C. Serbétis, Director, Fisheries Research Laboratory, Athens.
Israel	Bar Shimon, Technical Adviser, Fisheries Division, Ministry of Agriculture, Tel Aviv ; Yair Kedem, Acting Director, Department of Fisheries, Ministry of Agriculture, Tel Aviv.
Italy	G. Bazzuoli, Inspector General of Fisheries, Rome ; Professor A. Sparta, Director, Instituto Talassografico, Messina.
Yugoslavia	L. Krstinic, Economic Secretariat, Zagreb ; M. Ristic, Director, Experimental Fishing Station, Belgrade.

C. Utilization Committee

Egypt	Sami Geaorge, Technical Assistant, Institute of Hydrobiology and Fisheries, Alexandria.
France	A. Alloy, Director of Marine Fisheries, Ministère de la Marine Marchande, Paris.
Greece	A. Stephanides, Department of Fisheries, Ministry of Industry, Athens.
Israel	No members designated as yet.

Italy	G. Bazzuoli, Inspector General of Fisheries, Rome ; Mrs. G. Giacometti-Cannicci, Central Laboratory of Hydrobiology, Rome.
Yugoslavia	Borislav Parac, Commercial Manager of "Jugoriba", Zagreb ; R. Mikulic, Technologist, "Mirna" Company, Rijeka.

The first booklet by the General Fisheries Council for the Mediterranean has just been published. It includes the minutes of the first meeting, as well as the following technical papers :

J. le Gall	Prévention des accidents des scaphandriers.
R. Dieuzeide	Les "crevettes" des côtes d'Algérie.
C. M. Maldura	Perspectives d'utilisation des algues de la Méditerranée.
O. H. Oren	Tables for Computation of Sigma-T for Salinities from 38‰ to 41.00‰ and for Temperatures from 13.00° C. to 31.00° C.
K. Reich	Some Observations on the Present State of Pond Fish Culture in Israel.
A. Percier	L'ouverture du chalut en hauteur.
GFCM Secretariat	Les pêches en Méditerranée.

The Executive Committee at its third meeting (Split, 9-12 January 1953) expressed the desire that an information bulletin be published by the Council, so that all members could be kept fully informed of the activities of the Council. The first issue of the information bulletin was published in May, the next issue being planned for July.

*Expanded Technical Assistance Program**

Negotiations are still proceeding with the Government of *Brazil* for the provision of a team of experts during 1954.

Arrangements are being made under the fellowship program to enable a fishery officer from *British Guiana* to make a tour of the Far East to study fish culture practices.

Alan Glanville has resumed his work in *Ceylon* after a few months leave, during which he made a special study of fisheries in various parts of the world. The Danish fishing boats are now being put into use. Engines are being tried out in local craft and new engines are being purchased. Mr. Glanville is collaborating with E. R. Kvaran who is assisting the government in organizing the shore engineering facilities for servicing the fishing craft. This FAO/ETAP work is being co-ordinated with the Colombo Plan projects. The engineering facilities now being planned will be required by vessels provided under the Colombo Plan. Dr. J. C. Medcof of Canada, who has gone to

* This note should be read in connection with the previous reports given in this Bulletin, Vol. 5 No. 5, pp. 204-206, Vol. 5 No. 6, pp. 229, 230.

Ceylon to serve as biologist under the Colombo Plan, spent some time in Rome with officers of the Fisheries Division discussing the integration of the two programs.

J. Fridthjof is bringing his program of increasing the consumption of fish in *Chile* into a final stage. Dr. F. de Buen has commenced work on a six-months' assignment in fisheries biology to carry forward the work initiated by E. Poulsen.

As a consequence of the success of his fish culture work in the region the services of S. Y. Lin have been requested by the *Dominican Republic* and he is now engaged on a survey of the situation and will make recommendations for further action.

E. Schweigger is at present in the FAO Regional Office, Lima, Peru, preparing a report on his assignment in *Ecuador*.

On the recommendations of A. C. Taft during his assignment in *Finland*, three fellows were selected to undertake a study tour. These officers are at present on this tour in Europe and North America.

Shimon Tal is continuing a fish culture project in *Haiti* and has had success in encouraging the construction of new ponds.

M. O. Kristensen, of Norway, completed his assignment as Commercial Fisheries Consultant to the Government of *India* in connection with the deep sea operations out of Bombay, and his report will shortly be transmitted to the Government of India. F. Botke has completed his project on weed eradication and fresh water fisheries of West Bengal and is engaged on preparing a report. W. F. L. van der Heyden, in continuation of his project for the development of fishing operations in the Gangetic delta, has made several tours of the area and is developing plans for active work in the area. The recruitment is proceeding to provide India with a fishery engineer to work in Madras State, and a naval architect. The Division has maintained contact with the Norwegian Government's technical assistance project for India and made the services of M. O. Kristensen available for a short while during the initial stages. In addition, Gopinath Pillai, Director of Fisheries, Travancore, visited Rome en route to and from Norway and had discussions with officers of the Division concerning this Norwegian project which is located in his state. H. Kristjonsson of Headquarters visited India and Ceylon (*see* pp. 96-97).

The Government of *Indonesia* has requested the Organization to provide a fishery biologist and a fishery engineer to assist in the development of a marine shrimp fishery.

A. van den Eelaart has continued a survey of the inland fisheries of the Euphrates/Tigris river system of *Iraq* and has gathered extremely interesting information concerning the biology of the fish stocks of the system. G. Amodeo has been carrying out a survey of the inshore fishing operations in the head of the Persian Gulf.

G. S. Napier has concluded his assignment in connection with the sea fishing operations of *Israel*; and A. E. Hofstede has concluded his work on the inland fisheries on Lake Tiberias and will now concentrate on fish culture work in that country. During his visit to Israel

M. Girard, of Headquarters, discussed this work with Hofstede and Napier.

P. E. Paulsen completed his assignment in the fisheries of *Korea* and contributed material for the report of the FAO Agriculture, Fisheries and Forestry Mission, requested by UNKRA.

H. and J. van Pel have entered on the second year of the assignment in *Liberia* and have been obtaining some encouraging results in fishing from a small 10 h.p. boat. Their work is co-ordinated with, and is complementary to, the TCA program in the country (*see* report on p. 96).

N. Jangaard and H. Fibiger completed a survey of the fisheries of *East Pakistan* in respect of marketing and distribution and their joint report will shortly be transmitted to the Government.

K. H. Magnusson completed a short assignment as naval architect to *West Pakistan* and as a result of his work a second naval architect will be engaged to make special studies of the Pakistani problems, working in Rome.

L. Scattergood has continued his assignment as shrimp biologist for *Panama*.

The Government of the *Philippines* has requested FAO to provide a fishery gear technologist and a fishery biologist who would work on fundamental problems concerning the cultivation of *Chanos-chanos*.

The exploratory fishing survey in the waters of the Red Sea being carried out by Dr. M. K. El Saby and Luigi Farina on behalf of the Government of *Saudi Arabia* is now drawing to a close, having yielded interesting information on the abundance of various types of commercial fishes. In March, Dr. H. H. Brown, from Headquarters, paid a visit to this project.

The second phase of the fishery exploratory survey off the north coast of *Somalia* has now been completed and H. Ogilvie, A. Fraser-Brunner and D. Byrd are returning to headquarters to prepare the report of their work. In February, Dr. H. H. Brown paid a visit to this project.

Dr. S. W. Ling continues his project to assist the Government of *Thailand* in the development of the inland fisheries, and has had most encouraging results in the establishment of extension services.

Dr. G. A. Rounsefell, Dr. T. B. Lexow and A. Bergs have now assumed duty in *Turkey* to assist generally in the development of fisheries of that country and, in particular, to advise on rapid development of the fisheries of the Black Sea. Already an interim report has been submitted to the Government. Recruitment is proceeding for a fishery economist to join this team. Dr. G. L. Kesteven, of Headquarters, made a visit to the project.

In *Yugoslavia*, R. Vesterhus made a survey of the fish processing, particularly canning methods, and submitted a report. Dr. W. Wunder, fish pathologist, has begun his work in connection with fish diseases in fresh water ponds and has taken field material back to his laboratory in Germany for further study. Fellowships in inland fisheries and food processing and technology have been established.

FAO/ETAP Project in Liberia

Two FAO/ETAP fisheries experts have been active in *Liberia* for a period of one year, Hubertus van Pel as fisheries engineer, and Jan van Pel as fisheries technologist. Their assignment has just been extended for another year at the request of the Government.

Two small boats were furnished by FAO (a 22 ft. Danish motor fishing boat and a 29 ft. Accra canoe with outboard motor), the first motorized boats to be used by Liberian fishermen, after a short training period. Trawling and trolling have resulted in regular catches which are disposed of fresh to Monrovian customers. The proceeds are used to cover the local expenses (boat crews, watchmen, laborers, net makers).

The following shore installations have been erected according to plans and under direction of the experts: (*A*) a "fishery station" consisting of: (1) a jetty; (2) a building (40 x 20 ft.) to provide office space, storage space for oil and nets and net making facilities; (3) a second building of equal size to provide space for 2 smoke kilns, storage of fish processing supplies and equipment and space for handling and processing fish; (4) a yard for fish drying, net drying etc.; (*B*) a fish market, 52 x 20 ft. just outside the fenced-in "fishery station."

Successful experiments in fish smoking and drying have been carried out, producing acceptable preserved fish from less acceptable types of fresh fish.

Five Liberian counterpart technologists have been given intensive instruction and training in making and mending nets, net tanning, fishing methods, operation and maintenance of motors, elementary navigation, fish handling, fish processing and marketing.

A number of nets were made by trainees under the direction of the experts, including 38 ft., 28 ft., and 18 ft. trawl nets, a 9 ft. shrimp trawl net, lampara net, trammel nets.

It is planned to expand the work of the experts to other Liberian fishing ports, also to extend the fishing operations further offshore, if a larger boat becomes available.

The project shows great promise of succeeding in its endeavor, which is the introduction of improved fishing boats, fishing methods, fish handling, processing and marketing methods. This has been done by actual demonstration and simultaneous training of local fishermen and fish curers, for the purpose of increasing fish landings and preservation and thereby the animal protein supply in the diet of the local, and especially the inland, population.

Visit of Headquarters' Officers to India and Ceylon

H. Kristjonsson left on 26 April for a 5 week's visit to *India* and *Ceylon* to review several fisheries technical assistance projects now in operation or being planned in these countries. He visited fishing

villages in the Bombay area and went fishing with local fishermen. In the Sunderbans area of West Bengal he accompanied FAO/ETAP fisheries engineer van der Heyden and reviewed the progress of the latter's assignment to introduce and demonstrate improved fishing methods.

In Madras and Calicut, H. Kristjonsson is surveying the problems to be dealt with by the FAO/ETAP fisheries engineer to be stationed in the State of Madras during a forthcoming assignment.

In *Ceylon*, the work of FAO/ETAP fisheries engineer A. Glanville and marine superintendent E.R. Kvaran are being reviewed and the progress of their projects discussed and planned for the remaining part of their assignment. The possibilities of holding in Ceylon in 1954 an Indo-Pacific Training Center for Master Fishermen will be explored as well.

Jan-Olof Traung, Headquarters naval architect, visited New Delhi, *India*, from 16 to 31 January at the request of TCA and the Indian Government, for consultations on the proposals for the acquisitions of equipment for fisheries development under the U. S. Technical Cooperation Administration. He gave advice on various technical aspects of specifications, drawings, etc. of fishing craft and other equipment then under contemplation, and various aspects of these proposals were discussed at length.

From 31 January to 5 February he visited Karachi to discuss the work of H. Magnusson, FAO/ETAP naval architect, who was then making measurement drawings of local fishing craft. J-O. Traung also participated in the first trials of Pakistani fishing boats equipped with outboard motors, which had been purchased on his recommendation after a previous visit.

Personnel

Mogens Jul, Chief of the FAO Fisheries Technology Branch for the past five years, has resigned as from 30 November 1953, and will be returning to Denmark to take up a position as Director of Research Development with the Joint Board of Co-operative and Private Packing Houses of Denmark.

Dr. G. N. Subba Rao has joined the Technology Branch of the Fisheries Division as Fishery Products Technologist and as Assistant Editor for the *World Fisheries Abstracts*. Dr. Rao is from India and received his B. Sc. and M. Sc. in chemistry from the Central College, Bangalore. He spent several years at the Torry Research Station in Aberdeen, working mainly on physico-chemical changes in fish muscle proteins during freezing and cold storage, and received his Ph. D. from the University of Aberdeen in 1948. Since then he has worked on fish preservation problems, at the Deep Sea Fishing Station in Bombay and, prior to taking up his position in Rome, was senior scientific assistant at the Central Food Technological Research Institute in Mysore City, South India.

Publications

The *Commodity Standards for Fisheries Products* (FAO Fisheries Study No. 2) has been published in English, French and Spanish. This is a digest of current laws and regulations, concerning :

(1) standards of containers and packaging ;
(2) standards of weights ;
(3) standards of quality ;
(4) standards of description ;
(5) control of production for export ;
(6) export control, and
(7) import control.

This 157 page study contains information obtained from 32 countries and international organizations, some of the data being summarized in over 60 tables. The study may be obtained from FAO sales agents. price: U.S. $2.00 or 10s., or the equivalent in local currency.

The *FAO Yearbook of Fisheries Statistics*, 1950-51, published in April 1953, is the third statistical Yearbook to be prepared by the FAO Fisheries Division. It continues, revises and expands the statistics which were published in the two earlier issues of 1947 and 1948-49.

The statistical tables in the first two Yearbooks were to a certain extent still in the experimental stage ; this latest issue incorporates the many suggestions received by FAO from the users of the preceding two volumes. Now that effective liaison has been established with a larger number of member countries it has been possible to incorporate more comprehensive and up-to-date information.

The first tables in this Yearbook (1-4) constitute the catch section and present the available recorded and estimated figures for country and continental totals, as well as catch statistics for about 20 producing countries by major species groups.

The data indicates that the world's annual commercial and subsistence catch of fish, crustaceans and mollusks (excluding whales and other aquatic mammals) amounted to some 25,900,000 tons in the middle of the twentieth century. Of this total 15 % is landed in North America, 23 % in Europe and 46 % in Asia. Herrings, sardines, pilchards and similar species constituted 25 % of the total. Cod, hake and haddock and similar species 13 %, while the fresh water and brackish water fisheries produced 18 %. 45 % of the world's catch reach the consumer in the fresh state while only 4 % is frozen and 7 % canned. 32 % is utilized by the various curing yards, while the oil and meal reduction industry account for 10 % of the catch in addition to a considerable amount of offal and waste discarded in other utilization processes. The pattern of utilization varies from continent to continent. This aspect is brought out by the data in Table 5 of the second section on " Utilization ", which indicates how the species groups in 13 countries were used in 1950-51.

The other six tables in the second section present data of the production in various countries in 1938 and 1947-51 of the various frozen, cured and canned products, as well as the production of meals and fertilizers, body and liver oils and miscellaneous products from the whaling industry.

The third section deals with external trade and here the first series of tables present summaries of imports and exports by country of major commodity groups of fisheries products that enter into international trade. Import and export data by country are also given for a few selected items.

The subsequent 154 tables of this third section consist of individual import and export tables of 86 countries. Country tables are arranged in English alphabetical order within continental regions which are also listed in English alphabetical order.

The fourth section gives data (such as tonnage, number, value, etc. on the fishing fleets of 29 countries broken down by the craft categories characteristic of each country.

As a step towards eventual clarification, the current Yearbook provides, in the notes on species groups and on classification of external trade items, fairly detailed comments on classifications and definitions.

Three principal sources of information provided the basis for the statistics presented: first, the various official publications on export and import statistics: second, the communications from a number of the governments to whom the 1948-49 Yearbook tables, and drafts for the new tables, were referred for comment and completion: third, the FAO Questionnaire: Preliminary Report on Landings and Utilization, which with some revisions, has been circulated annually since 1946.

The tables are followed by a section on conversion factors used in connection with the conversion to the metric system of the original data on quantities. For exchange rates and factors that may be used in converting values expressed in the various national currencies, the readers are referred to the series of *International Financial Statistics*, published by the International Monetary. Fund and *Direciton of International Trade*, published jointly by the Statistical Office of the United Nations, the International Monetary Fund, and the International Bank for Reconstruction and Development.

FAO estimates are subject to revision as additional information becomes available. As yet the inadequate statistical records of fisheries activities in many parts of the world preclude complete coverage. It is hoped, however, that within the next few years much of the data lacking will gradually become available. Readers are invited to assist meeting further needs for fisheries statistics through international cooperation.

The *FAO Yearbook of Fisheries Statistics* 1950-51 is priced at U.S. $3.50 or 17/ 6d. in pounds sterling. Payment can be made to the FAO sales agents listed on the inside back cover of this bulletin.

Notes on Films

SHOOT THE NETS. Producer : Herman van den Horst, Haarlem, The Netherlands. Distributor : non-commercial distribution, MSA Special Mission, Paris. Technical data : 16 and 35 mm. black and white. sound, 21 minutes running time, 1,970 feet, commentary and titles in English, Italian and Dutch. Produced in 1951. Price : 16 mm. Fr. frs. 11,000.

Shows the Dutch herring drifter fleet being prepared for the season: barrels are made and old ones repaired, filled with salt, and stowed in the boats. Nets are made, mended, barked, dried and taken aboard. After a traditional celebration, the men go aboard and the boats leave harbor and, head towards the Dogger Banks.

The fishermen talk over the radio-telephone, scan the sea for birds and whales and other signs of herring and watch for indications of fish on the echo sounders. The nets are shot in a three-mile-long string with marker floats at intervals, and let drift in the sea overnight. At 2 a. m., the crew rises, gets into oilskins and starts hauling the nets by hand over a roller on the side of the ship, at the same time shaking the herring loose from the nets. The herring are gilled and salted in barrels and brought home to port.

The film received the first prize for documentary films at the Cannes Film Festival in 1952, probably in appreciation of its general interest and good photographical effects. It gives comparatively few technical details of this phase of the Dutch fishing industry. H. K.

DIE SEEFISCHE [MARINE FISHES]. Producer and distributor : Kultur und Lehrfilm-Institut, Klemens Lindenau, Delmenhorst, Germany. Technical data : 16 and 35 mm., black and white, sound, 1,288 feet, 15 minutes running time, commentary and titles in German. Made in 1951. Price of prints : 16 mm. : DM. 300 ; 35 mm. : DM. 400. Rental : DM. 100.

The film is intended to give an over-all impression of the rather high degree of industrialization found in modern fish trade. It contains pictures of fish unloading at the pier auction rooms, packing for marketing, with glimpses of beheading, filleting, and skinning machines for white fish, large fillet packing rooms, shipment by express trains, charts of fresh fish distribution routes in Germany, unloading and repacking in ice and shipping to the final destination by truck. Shown briefly are various fisheries industries, such as the manufacture of smoked salmon substitute (Seelachs), smoking of herring and its manufacture into marinades, jellied fish, rollmops, etc., employing washing and filleting machines. Herring canning is also shown, including the use of a German machine for heat treatment of herring packed raw into cans, the use of counter-pressure retorts, etc. M. J.

Notes on Publications

FWS 9.6 PUBLICATIONS — JAPAN UDC 05 : 639.2 (52)

Yoshihara, T. and Oshima, Y. First Draft of the List of Periodi-
1952 cals in Japanese Fisheries. Department of Fisheries, Tokyo University (?), Tokyo, Japan. 72 pp. In Japanese.

Lists the Japanese periodicals on fisheries published since 1880. Gives the title, name of publisher, and date of first issue.

FWS 1.6 FISHERIES STATISTICS — FLATFISHES UDC 31 : 639.2

Bell, F. H., Dunlop, H. A., and Freeman, N. L. Pacific Coast Halibut
1952 Landings 1888 to 1950 and Catch according to Area of Origin. *Report* No. 17. International Fisheries Commission, Seattle, Washington. 47 pp. In English.

Gives the annual halibut landings of the Pacific coast fishery from 1888 to 1950, the origin of those landings according to the 1950 regulatory areas and the distribution of the landings on major sections of the coast after 1910. A comprehensive analysis of the statistical tables has been made in the light of the accuracy of the data presented, and the reliability of the sources consulted. A list of the published reports of the International Fisheries Commission is presented in an appendix.

FWS 9.2 FISHERIES STATISTICS — ITALY UDC 31 : 639.2 (45)

Italy, Istituto Centrale di Statistica. Statistica della Pesca e della Cac-
1952 cia negli Anni 1949 e 1950 [Fish and Wildlife Statistics, 1949 and 1950]. Istituto Poligrafico dello Stato, Rome, Italy. 75 pp. In Italian. Price : Lire 500.

Gives statistics on annual and monthly landings from marine and lagoon fisheries for selected species groups of fish, crustaceans and molusks, with geographical breakdowns by coastal zones, provinces and regions, and administrative marine limits. Also gives more detailed breakdowns for tuna and similar species catches in fixed traps ("Tonnare" and "Tonarelle") by distribution in the markets. Data on imports, prices and values of the total catches appear in the other sections of the publications. There is a short resumé of the main trends in the Italian fisheries for the period 1947-50 in an appendix.

FWS 9.2 FISHERIES STATISTICS — JAPAN UDC 31 : 639.2 (52)

Japan, Ministry of Agriculture and Forestry, Statistical Research Branch.
1952 Agriculture, Forestry and Fishery Statistics Monthly. Tokyo, Japan. No. 1, April 1952. In Japanese.

A new bulletin containing statistics on all aspects of fisheries, including fish culture, catch, number of fishermen, etc.

FWS 0.6 STATISTICS — CANNING UDC 31 : 664.8.036.5

International Tin Study Group. The Statistical Yearbook, 1952.
1952 Tin. Tin Plate. Canning. International Tin Study Group, 7 Carel van Bylandtlaan, The Hague, The Netherlands. 268 pp., 7 maps, charts. In English. Price : US$5.60, £2, Gld. 21.50 or equivalent.

The 1952 *Statistical Yearbook of the International Tin Study Group* is in two main parts. The first contains a series of general articles on events in recent years in the world tin and tin plate industries ; the second has a very detailed statistical presentation of the tin, tin plate and canning position in no less than 110 different countries.

The canning industry, which is so great a user of tin and tin plate, is given particular attention. Information covers not only the more important canning countries (the U.S.A., Great Britain, Canada, France, Australia, etc.) but also countries such as Iran, Colombia, Cuba and Algeria. The Yearbook includes a number of maps and charts on Thailand, the Belgian Congo, Bolivia, the U.S.A., and Nigeria.

FWS 9.4 FISHERIES ADMINISTRATION — FRANCE UDC 35 (44)

France, Conseil supérieur de la pêche. Bulletin officiel d'information
1950 du Conseil supérieur de la pêche [Official Bulletin of the Fisheries Council], 1 Avenue de Lowendal, Paris, No. 1, July/September 1950. In French. Free.

The Conseil supérieur de la pêche was set up by the French Government and charged with certain responsibilities in regard to the conservation, management and development of fresh water fisheries resources. In addition to eight representatives from various governmental administrations, it comprises 12 delegates from departmental federations of fish and fish culture associations and 3 delegates from fishermen, under the presidency of the Directeur-Général des Eaux et Forêts. In order that the activities and decisions of this Council should be fully appreciated and understood it was decided in 1950 to publish this bulletin. It is a quarterly publication and is distributed free to the various organizations concerned with fresh water fisheries. The bulletin is divided into six sections, dealing with activities of the Council ; technical papers ; official information and instructions ; legal issues ; appointment, advancement, etc. of Guards ; and miscellaneous information. The series to date contains a most valuable and informative account of the work of the Council during the past two years and provides a comprehensive and orderly selection of information of immediate importance to those engaged in the various fields of fresh water fisheries activities.

FWS 9.11 OCEAN UDC 551.46

Italy, Consiglio Nazionale delle Ricerche. Bibliographia Oceanographica
1952 [Oceanographic Literature]. Vol. XX, 1947. Piazzale delle Scienze, 7, Rome, Italy. 170 pp. In Italian. Price : Lire 1,500.

This contributes to the science of the sea and related fields for 1947, giving a full bibliographical reference and brief note on contents. Contains an author's index.

Tarp, Fred H. A Revision of the Family Embiotocidae [The Surf Perches]. *Fish Bulletin*, No. 88. California Department of Fish and Game, Bureau of Marine Fisheries, Sacramento, California, U.S.A. 99 pp., 32 figs. In English.
1952

A systematic examination of the surfperches, a viviparous species familiar to anglers and commercial fishermen along the Pacific coast of the U.S.A. 23 species are considered. The viviparity, origin and geographic distribution and evaluation of the group are discussed.

FWS 1.5 COD, HAKE, ETC. UDC 597.5

Da Franca, Pedro. *Merluccius merluccius* (L.) e *Merluccius senegalensis* Cadenat: seus Caracteres Distintivos [The Distinguishing Characteristics of *Merluccius merluccius* (L.) and *Merluccius senegalensis* Cadenat]. *Notas e Estudos do Instituto de Biologia Marítima*. (Instituto de Biologia Marítima, Cais do Sodré, Lisbon, Portugal), No. 3, August 1952. 36 pp., illus., tables, appendix. In Portuguese, with French summary.
1952

A study made to verify the differences between the white and black hake landed in Portugal with the commercial catch. The morphological, anatomical and meristic characters of 180 specimens were examined and it was concluded that white hake corresponds to *M. merluccius* and black to *M. senegalensis*. The first is caught in European waters and the second in Atlantic African waters. The appendix contains some observations on two other species of hake from Angola: *M. polli* and *M. capensis*.

FWS 1.1 TUNAS, MACKERELS, ETC. UDC 597.5

Schaefer, Milner B. Comparison of Yellowfin Tuna of Hawaiian Waters and of the American West Coast. *Fishery Bulletin* 72. United States Department of the Interior, Fish and Wildlife Service, Washington 25, D.C., U.S.A., 20 pp., graphs, tables. In English. Price U.S.$0.15.
1952

Measurements of various characters on 203 specimens of *Neothunnus macropterus* from the vicinity of the Hawaiian Islands are compared with similar data for *N. macropterus* from waters adjacent to the American west coast. The comparisons are made by means of a series of linear regressions. Conclusions are given on the status of the stock of yellowfin tuna of the Central Pacific, suggesting that this is a population distinct from that along the American west coast.

FWS 1.2 HERRINGS, ETC. — NORWAY UDC 597.5 (481)

Aasen, Olav. The Lusterfjord Herring and its Environment. *Fiskeridirektoratets Skrifter, Serie Havundersokelser*, [Reports on Norwegian Fishery and Marine Investigations]. Vol. 10, No. 2. Director of Fisheries, Bergen, Norway. In English. 66 pp., 3 pl.
1952

Report on an investigation of the herring of Lusterfjord, Norway, on the assumption that a local herring race represents, in certain respects, a model of larger stocks in the ocean. The herring of this fjord is a special type having a short life cycle, slow growth rate, low vertebral number and small size when fully grown. The topography, hydrography and plankton of the fjord were examined, and it is concluded that the population should form useful material for the purpose of studying the biology of herring in relation to external factors.

FWS 1.2 HERRINGS, ETC. — SWEDEN UDC 597.5 (485)

Molander, Arvid R. The Sprat Fishery and the Sprat of the West
1952 Coast of Sweden. Institute of Marine Research, Lysekil. *Series Biology, Report* No. 2. Fishery Board of Sweden, Stockholm, Sweden. 67 pp. with chart. In English.

Discusses the sprat catch on the west coast of Sweden for the period 1936 to 1948. The variations in size and composition of catch by year, month and locality, are discussed in relation to evidence on the stock of sprat in the Skagerrak and the Kattegat and data on hydrographic and meteorological factors. Certain relations between the distribution of sprat and prevailing hydrographic conditions are indicated.

FWS 9.1 - FISHERIES RESEARCH — ITALY UDC 639.2.001.5 (45)

Vatova, Aristocle, and Faganelli, Armando. Le Valli Salse da Pesca
1951 del Polesine [Salt Water Fishing Lagoons of Polesine]. *Nova Thalassia* (Istituto di Biologia Marina per l'Adriatico, Venezia, Italy), Vol. 1, No. 10. 83 pp., illus., tables. In Italian.

Investigations during 1950 and 1951 of the salt water fishing lagoons of Polesine are reported. The first paper, "Biological Research," by Vatova, reports extensive records of the fauna observed in these lagoons, consisting chiefly of mollusks, crustacea and polychaete worms. The second paper, "Hydrographic Research," by Faganelli, reports hydrographical investigations comprising the observation of temperature, pH, salinity, oxygen, phosphates and nitrates.

FWS 9.10 FISHERIES RESEARCH, BIOLOGICAL UDC 639.2.001.5 (56)
— TURKEY

Hydrobiological Research Institute. *Publications* (Faculty of Science,
1952 University of Istanbul, Turkey), Series B, Vol. 1, Nos. 1 and 2. 84 and 64 pp. illus.

A series of publications started by the newly formed Hydrobiological Research Institute, containing scientific papers of interest for the study of Turkish hydrobiological problems. Series B contains papers written in English, French, German and Italian, which are summarized in Turkish in Series A; also contains a summary of the articles published in Turkish in Series A.

No. 1 contains two papers in English: "Some Field-notes on the Fauna of the Suez Canal (Timsah and Bitter Lakes)," and "Genetical Contributions to the Systematical Relationship of Anatolian Cyprinodont Fishes;" and one in German: "Ueber Süsswasser-Ostracodon aus der Türkei." No. 2 contains two papers in German: "Die Zoogeographie der Türkischen Süsswasserfische," and "Freilebende Ruderfusskrebse (Crustacea Copepoda) aus Türkischen Binnenwässern;" and one in English: "A Note on the Yearly Temperature and Salinity Cycle in the Dardanelles."

FWS 2.12 FISHING, EXPERIMENTAL UDC 639.2.001.5 (66/675)
— WEST AFRICA

Boavida, Joaquim Gormicho. Reconhecimento da Area Marítima Fron-
1952 teira à Costa Occidental Africana, con Vista à Descoberta e Localização de Novos Pesqueiros Susceptíveis de Exploração Remuneradora pela Frota de Arrasto Nacional [Charting of the Maritime Area of the West African Coast with a View to Discovering and Mapping out New Fishing Grounds Suit-

ABLE FOR ECONOMIC EXPLOITATION BY THE NATIONAL TRAWL FISHING FLEET]. *Publicação* No. 5, Gabinete de Estudos das Pescas, Lisbon, Portugal. 77 pp., charts, illus. In Portuguese, with English summary.

An account of three hydrographic and exploratory fishing cruises conducted off the Mauretania and Senegal coast and Cape Verde Island in the area between latitudes 17° 25′ N and 57′ N between the 10 and 250 fathom contours. Gives fishing charts drawn as a result of the survey, a description of the craft and equipment used in the work, and full information on the results of every trawl.

FWS 9 1 FISHERIES RESEARCH, BIOLOGICAL — EAST AFRICA UDC 639.2.001.5 (676/679)

East Africa High Commission. EAST AFRICAN FISHERIES RESEARCH
1952 ORGANIZATION ANNUAL REPORT 1951. Government Printer, Nairobi, British East Africa. 49 pp., illus., tables, appendices, map. In English.

Includes sections on research work carried out in the Institute on such subjects as growth and sexual development of fresh water fish under tropical conditions, bionomics of local fishes and mollusks and the hydrology and algology of East African waters. Lists data on the chemical and physical properties of 15 fish-producing bodies of water, including Lake Victoria. Gives information on mollusk eating Cichlidae and possible methods of biological control of Bilharzia in permanent ponds and reservoirs.

FWS 9.1 FISHERIES RESEARCH, BIOLOGICAL — CANADA UDC 639.2.001.5 (71)

Hart, J. S. GEOGRAPHIC VARIATIONS OF SOME PHYSIOLOGICAL AND MOR-
1952 PHOLOGICAL CHARACTERS IN CERTAIN FRESHWATER FISH. *Biological Series* No. 60, University of Toronto. Publications of the Ontario Fisheries Research Laboratory, No. LXXII. University of Toronto Press, Toronto, Ontario, Canada. 79 pp., 18 tables, bibl. In English.

A report on a study of the geographic variation of lethal temperature in ten species of freshwater fish. Many of the species possessed uniformity in lethal temperatures over wide geographical ranges. The lethal temperature findings did not confirm the accepted taxonomic status in several species; in other, with geographic differences in lethal temperatures, there was agreement with the taxonomic status. The lethal temperatures appear well above the thermal extremes commonly encountered in the environment and may therefore have little ecological significance.

FWS 9.1 FISHERIES RESEARCH, BIOLOGICAL — U.S.A. UDC 639.2.001.5 (73)

California Department of Fish and Game, Marine Research Committee.
1952 CALIFORNIA COOPERATIVE SARDINE RESEARCH PROGRAM, PROGRESS REPORT, 1 JANUARY 1951 TO 30 JUNE 1952. 51 pp., illus. In English.

Reports the progress of this program. Part I gives the investigations on the biology of the sardine and its environment, and Part II a prognostication of the outlook for the fishery. The principal sections of Part I relate to the distribution of the sardines, their numbers, abundance and behavior, including an account of experimental acquarium work, and the oceanographic conditions of the Californian coast, including food supply and predators and competitors.

FWS 9.1 FISHERIES RESEARCH — U.S.A. UDC 639.2.001.5 (73)

PUBLICATIONS OF THE INSTITUTE OF MARINE SCIENCE (University Publi-
1950 cations, University of Texas, Austin 12, Texas), Vol. 1, No. 2, November 1950. 194 pp., charts. In English. Price: U.S.$ 1.50.

This number carries 5 papers dealing with the invertebrata and fishes of the coast of Texas, and an introductory paper on the hydrography of tidal waters of Texas. The invertebrate studies include an account of the seasonal changes in populations and distributions of certain invertebrates as related to salinity and a preliminary survey of the invertebrate fauna of jetties on the Texas coast. The introductory study of the hydrography of tidal waters is concerned with temperatures, salinity and tides.

FWS 9.1 FISHERIES RESEARCH, BIOLOGICAL — U.S.A. UDC 639.2.001.5 (73)

PUBLICATIONS OF THE INSTITUTE OF MARINE SCIENCE (Institute of Marine
1952 Science, Port Aransas, Texas, U.S.A.), Vol. 2 No. 2. December 1952. 215 pp, illus. In English. Price: U.S.$ 2.25.

Contains 5 papers dealing with parasitic crustacea from the Texan coast; carangidae of the Northern Gulf of Mexico; historical changes in the Mississippi river and the adjacent marine environment; Actiniaria, Zoantharia and Ceriantharia from the Northwestern Gulf of Mexico; and with some Nematodes, parasitic in marine fishes.

FWS 2.112 FISHING METHODS AND GEAR — DIRECTORIES UDC 639.2.081

United States Department of the Interior. Fish and Wildlife Service.
1952 PARTIAL LIST OF MANUFACTURERS OF FISHING GEAR AND ACCESSORIES. *Fishery Leaflet* 195, revised September 1952. Washington, D.C., U.S.A. 8 pp. In English.

Revises an earlier list of manufacturers of fishing gear and accessories (*see FAO Fisheries Bulletin*, Vol. 4, No. 1/2, p. 59).

FWS 2.112 FISHING METHODS AND GEAR — CANADA UDC 639.2.081 (71)

Wooding, F. H. PURSE SEINES TO LOBSTER POTS. Department of Fish-
1952 eries of Canada, Ottawa, Canada. 19 pp., illus. In English.

Gives a brief general description in popular style of all fishing methods of commercial importance in Canada, such as long lining for cod and halibut, trolling, lobster and crab fishing, gill-netting, fishing in weirs and traps, purse seining, trawling, spear fishing, harpooning and shellfish dredging.

FWS 1.2 FISHERIES — HERRINGS, ETC. UDC 639.222.5

Phillips, Julius B., and Radovich, John. SURVEYS THROUGH 1951 OF
1952 THE DISTRIBUTION AND ABUNDANCE OF YOUNG SARDINES (*Sardinops aerulea*). *Fish Bulletin*, No. 87. California Department of Fish and Game, Bureau of Marine Fisheries, Sacramento, California, U.S.A. 63 pp., 13 figs. In English.

The sardine survey work of 1938, 1939, 1940, 1950 and 1951, is summarized and in two separate papers a detailed report is made of the results of surveys in Californian and Mexican waters in 1938, 1940 and in 1950, 1951. The relationship of the sardine occurrences to environmental conditions is noted. The strength of various year classes is reported and it is noted in the second paper that radar and echo sounder were of help in collecting samples and that age-reading was a help in evaluating the data.

FWS 1.1 FISHERIES — TUNAS, MACKERELS, ETC. — JAPAN UDC 639.227.4 (52)

Kawana, Takeshi. On the Relation Between the Tuna Fishery and Oceanographic Conditions. *Special Scientific Report: Fisheries* No. 78. United States Department of the Interior, Fish and Wildlife Service, Washington, D.C., U.S.A. July 1952. 33 pp., tables, graphs. In English.

1952

Translation from Japanese by Wilvan G. Van Campen of "Report of Fisheries Investigations (Suisan Chôsa Hôkoku)," Vol. 31, published by the Hokkaido Fisheries Experiment Station, March 1934. Information is given on observations on the black tuna fishery during the years 1918-1932. The catches have been related to effort and have been analysed in relation to sea water temperature and the behavior of currents, and to various meteorological factors.

FWS 1.1 FISHERIES — TUNAS, MACKERELS, ETC. — JAPAN UDC 639.227.4 (52)

Oceanographic Conditions and the Albacore Grounds East of Cape Nojima. *Special Scientific Report: Fisheries* No. 77. United States Department of the Interior, Fish and Wildlife Service, Washington, D.C., U.S.A. July 1952. 18 pp., illus., tables. In English.

1952

A translation from Japanese by Wilvan G. Van Campen of the "Contributions to Fisheries Guidance, No. 2," published by the Hiyagi Prefecture Experiment Station in April 1939. Japanese albacore landings of 1929-1938 were examined in relation to oceanographic conditions, chiefly in respect to temperature. Some suggestions are made on the migrations of albacore in explanation of the changes in distribution of the species.

FWS 9.17 FISHERIES MANAGEMENT — EASTERN PACIFIC OCEAN UDC 639.32 (266)

International Fisheries Commission. Regulation and Investigation of the Pacific Halibut Fishery in 1951. *Report* No. 18. Seattle, Washington, U.S.A. 29 pp., 1 chart, table. In English.

1952

Reports the activities of the Commission in 1951, and gives the condition of the fisheries in different areas, statistics, and 1951 regulations.

FWS 6.3 SEAWEEDS — UNITED KINGDOM UDC 639.64 (410)

Institute of Seaweed Research. Annual Report, 1947-1951. Inveresk Gate, Musselburgh, Midlothian, Scotland. About 34 pp. each, illus. In English.

1947-1951

The Annual Reports cover the work of the 3 divisions of the Institute (Botanical, Chemistry and Engineering) and Agricultural Utilization; they list the scientific and technical reports issued during each year and give lists of the Board of Management, its advisory committees, the Institute members and the staff. For 1949 and 1950 the divisional work is reported under the headings: Algology, Algal Chemistry, Agriculture and Engineering; in 1951 under the headings: Phycology, Microbiology, Alga-Chemistry, Chemical Engineering, Mechanical Engineering and Utilization. At the end of 1951 the total staff numbered 40. The total number of publications from 1946 to 1951 is 48 papers and reports.

FWS 2.6 FISHERY PRODUCTS, CONSUMPTION — U.S.A. UDC 641 (73)

Stolting, Walter H., and Garfield, Morton J. Fish and Shellfish Preferences of Household Consumers, 1951. Part I, National Summary; Part II, Regional Summary. *Fishery Leaflets.* 407, 408. United States Department of the Interior, Fish and Wildlife Service, Washington 25, D.C., U.S.A. Part I, 46 pp., May 1952; Part II, 66 pp, September 1952. In English. Free.

The first of a series of reports on a nationwide sampling survey of fish and shellfish preferences of household consumers conducted under the auspices of the Fish and Wildlife Service in October 1951. Gives the percentage of individual households which used fishery products during the twelve months preceding the survey, the estimate percentage of frozen, fresh, and canned fish consumed. Part II gives tabulations of the findings for four regions of the U.S.A. and shows as a main feature of the survey that frozen shellfish in the west and frozen fish in the north central area and west provide the major source of fish and shellfish requirements in these areas by the present purchase patterns revealed through the survey.

FWS 2.116 SOUNDING AND SOUNDINGS UDC 656.61

Serrano, Edmundo Seco. Velocidad Vertical de Propagación del Sonido en el Mar de Alborán. Aplicación a la Corrección de Ecosondas [Vertical Velocity of Sound in the Alboran Sea. Application to the Correction of Echo Sounders]. *Boletín* No. 50. Instituto Español de Oceanografía, Ministerio de Marina, Madrid, Spain, 26 April 1952. 20 pp., tables, charts, bibl. In Spanish.

Reports an investigation of the vertical velocities of sound in the Alborán Sea and the application of these results to the correction of echo sounding data.

FWS 9.4 FOOD INDUSTRY AND TRADE UDC 664

Food Industries Manual. 17th ed. Leonard Hill Ltd., 9, Eden Street, London. Illus., tables, 136 pp. In English. Price: 42/s.

An encyclopedia of food manufacture. Revises the 1950 edition reviewed in *FAO Fisheries Bulletin*, Vol. 3, No. 6, p. 156.

FWS 3 FISH PRESERVATION UDC 664.95

Jul, M., and Kondrup, M. (Editors). The Technology of Herring Utilization. Report of the FAO Meeting on Herring Technology, Bergen, Norway, 24-29 Sept. 1950. *Fiskeridirektoratets Skrifter, Serie Fiskeri* (Director of Fisheries, Bergen, Norway), No. 1 Vol. 2. 404 pp., illus. In English. Price: N.Kr.14.

The papers and discussions are arranged according to subject so that they can be used as a handbook. The report contains contributions from fisheries technologists of Belgium, Canada, Denmark, Finland, France, Iceland, the Netherlands, Norway, Sweden, United Kingdom, United States of America, Western Germany and FAO. The chapter headings are: Scope and Results of the Meeting; The Herring Industries; The Herring Marketing Situation; Possibilities for finding Markets of Herring Products in Asia and Africa; Fish Protein Products made by Fermentation or Chemical Hydrolization; Fresh Herring; Eviscerating, Boning and Filleting Machines; Freezing of Herring; Salted and Spiced Herring; Herring Delicatessen and Marinated Products; Smoking, Drying and Dehydration of Herring; Herring Canning; Manufacture of Herring Oil and Meal; Fish Solubles, Whole Meal, etc.

Stabilimento Tipografico Fausto Failli - Roma